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"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9124416

ORIGINATOR: 02

SPEECH: YES NO

FROM: VEST, Charles M.: MIT

Your calendar is
open if you are
interested.

OK M

DATE OF EVENT: 04/09/92 THRU:
TENTATIVE DATES:

LOCATION OF EVENT: MASSACHUSETTS INSTITUTE OF TECHNOLOGY

TIME OF EVENT: 9:00 A.M.-5:30 P.M.

SUBJECT: AN INVITATION TO BE A PANELIST AT A ONE DAY
CONFERENCE ON THE NATURE AND EXTENT OF RESEARCH AND
EDUCATIONAL INTERACTIONS BETWEEN RESEARCH
UNIVERSITIES, INDUSTRY AND GOVERNMENTS OF FORIEGN
COUNTRIES.

RSVP: 10/30/91

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED?

YES

~~NO~~

COPIES TO: Michelle Van Clea
INTERNATIONAL/POL
INDUSTRIAL

REMARKS:

10/24/91 - accepted to Laura Mersky!

mr

CLOSED

DATE OF LETTER: 10/11/91

DATE RECEIVED: 10/16/91

FILE: P-INVITATION-PANEL

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9124416

ORIGINATOR: 02

SPEECH: YES NO

FROM: VEST, Charles M.: MIT

DATE OF EVENT: April 9 04/09/92

THRU:
TENTATIVE DATES:

LOCATION OF EVENT: MASSACHUSETTS INSTITUTE OF TECHNOLOGY

TIME OF EVENT: 9:00 A.M.-5:30 P.M.

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OK M



CHARLES M. VEST, PRESIDENT

ROOM 3-208
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CAMBRIDGE, MASSACHUSETTS 02139-4307
617-253-0148

October 11, 1991

The Honorable D. Allen Bromley
Assistant to the President for Science and Technology
Old Executive Office Building
17th and Pennsylvania Avenue, NW
Washington, DC 20506

Dear Allen:

One of the major issues confronting American research universities such as MIT is the nature and extent of their research and educational interactions with industry, universities and governments of foreign countries. The subject has become an important political matter in recent years, especially as concern has risen about the nation's technology competitiveness.

We are planning a one-day conference on April 9, 1992 to bring the range of views before the community, and would be very pleased if you were able to join us and participate as a panelist on the program. The conference will have as its starting point a study on this subject completed in May of this year by a faculty committee under the direction of Professor Eugene B. Skolnikoff; a copy is enclosed in the event you have not seen it.

The agenda of the conference will provide for expression of the views of industry, of the American government, of foreign industries or government, and of American universities. Professor Skolnikoff will be co-chair, along with Professor Richard Lester, who was executive director for an earlier MIT study on productivity of American industry that resulted in the book Made in America, and is currently director of the MIT Industries Project.

We would hope that you could present in roughly twenty minutes how you see the various aspects of this issue from your perspective, and what you believe our policies should be. There would then be opportunity for discussion among the panelists and questions from the audience. No formal paper is necessary, though a paper would be useful in the event it proves feasible to publish the proceedings.

The conference will begin at 9 AM on April 9, so that it is advisable to arrive the evening before. No formal session is planned for the evening of April 8, but we will assemble as many of the participants and invited guests as are present for an informal dinner; we hope you can join us. The conference will finish by 5:30 PM on April 9. We can, of course, provide transportation and local costs if that is necessary.

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OFFICE OF THE
DIRECTOR

My colleagues and I hope that you will be able to join us for what ought to be a particularly interesting occasion and one of considerable importance for us.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Chuck".

Charles M. Vest

CMV/aph
Enclosure

The International Relationships of MIT in a Technologically Competitive World

Summary

Faculty Study Group, Appointed by the MIT Provost, on the International Relations of MIT

The research universities of America have been a major contributor to American leadership in science and technology, helping to meet the nation's economic, security and social needs. Today, new pressures face these universities as the setting in which they are embedded has changed dramatically, especially in its international dimensions. Important issues must be faced, many arising from the new environment of intense economic competition among nations, increasingly driven by the growing strength of science and technology abroad.

Accordingly, a Faculty Study Group was formed by the Provost of MIT and charged with the task of advising the Administration and Faculty on the general principles and policies that should guide MIT's international activities and relationships, with particular reference to economic implications. A brief discussion of our recommendations follows; extended discussion is to be found in the full report.

General principles

MIT is a research university committed to fostering education and advancing knowledge for the betterment of the human condition. It is, at the same time, a national institution rooted in American culture and traditions and an integral part of the nation's education and research system. MIT's responsibility to the nation in which it was founded and nurtured is served first and foremost by maintenance of its position as a premier institution in education and research in science and technology.

The commitment to maintain preeminence requires that MIT be thoroughly engaged in international activities in science and technology and that its faculty, students and research staff be able to interact fully and openly with, and stay abreast of, research wherever it is carried out.

This commitment also requires that quality be a primary criterion for selection of faculty and research staff and for admission of students.

MIT's responsibility to the nation mandates a strong interest in America's economic health, calling for programs and activities that go beyond the Institutes's basic contribution through education and research. In particular, we recommend an intensification of MIT's traditional mission of transfer of knowledge to the community at large, especially to American industry.

Occasionally, there may be major conflicts between national and international roles. In the resolution of such conflicts, we believe the Administration, with the advice of the Faculty, should give primary weight to the general responsibility to the nation.

These general principles can be in conflict or give imprecise guidance in specific cases; the Committee therefore examined the variety of international relationships in which MIT is engaged.

Students, alumni, and faculty

The primary goal of the undergraduate program is education, although undergraduates also take an active part in research at MIT. International students, now close to 9% of the undergraduate student body, provide a degree of diversity which is an essential aspect of undergraduate education. We believe this proportion is about right. The current policies of equal tuition and equivalent treatment in the MIT financial aid process for U.S. and international undergraduates are also appropriate.

At the graduate level in science and engineering, research and education become essentially indistinguishable. Academic quality is the primary consideration for admission, and should continue to be so. International students constitute about 33% of MIT's graduate students; however, the admissions process is decentralized to the departments, so that the distribution is quite uneven across fields.

In those departments for which the number of high-quality applicants from both the U.S. and abroad is far greater than the number of places, limits (formal or informal) on admission of foreign applicants have been in place for a number of years. This practice seems acceptable to us, since it preserves opportunities for American students, without violating the criterion of quality. Similarly, we see the partiality in financial aid that results from Federally programs restricted to American citizens as an appropriate way to encourage greater participation of American students.

Some MIT programs (such as Leaders for Manufacturing) are designed to address American industrial needs. We would expect American students to be predominantly admitted to such programs, but there should not be a prohibition on participation by international students.

The employment of students upon graduation is a major channel for transfer of knowledge from academia to industry. MIT alumni who join industrial firms abroad may become factors in increasing foreign competition for American firms. However, a large fraction of international students (e.g., about 60% of those receiving doctorates) elect to stay in the U.S., resulting in a significant net contribution to American industry and universities.

This inflow has also led to a resurgence of concern about a "brain drain" from developing countries. MIT does not tailor its core curriculum to the needs of those countries. The unique quality of that curriculum depends on its close interaction with the cutting edge of research, which cannot be altered by fiat. Although this policy is appropriate in the light of MIT's primary missions, the brain drain is a serious issue which deserves attention by the U.S. Government and by the countries affected.

MIT hires faculty and senior research staff without discrimination on the basis of nationality, a policy we believe is essential to fulfill MIT's commitment to preeminence in research.

Access to research at MIT

The investment of Federal funds in the research universities has been of great value to the strength and vitality of the nation. There can be no doubt that much of

the past investment has paid off handsomely. The challenge is to see that it continues to pay off in the future. A crucial element of success in research is open communication, now made more important by the global spread of high-quality science and technology. For MIT to remain a preeminent research and education institution, open communication must characterize relationships with foreign colleagues.

Other nations have undoubtedly benefited economically from the American investment in science and technology at MIT and other research universities, as the U.S. benefited from earlier European investments in those fields. We think it appropriate that foreign firms and nations help to ensure that the research base is maintained, by adding money as well as knowledge to it, especially in a climate of increasing financial pressure on research universities.

This is not meant to suggest that most of the economic benefits of MIT research flow abroad. Preliminary results of a recent survey of the faculty and research staff about their international relationships suggest that the preponderance of their contacts with industry is with U.S.-based corporations. The most significant relationships that provide access to research at MIT include the following:

1. Visiting faculty, post-docs, and research scientists

An important route for transfer of knowledge from MIT is through extended visits that provide access to research results in preliminary and prepublished form, give indications of promising directions of research, and provide exposure to intangible aspects of processes and techniques.

Long-term visitors (a semester or more) are normally invited to the Institute on the basis of their knowledge and expertise, both to contribute to research projects and to learn from their stay. Openness in the exchange of knowledge should be a condition of all such visits. In essence this means that the host should have a realistic expectation that visitors will participate appropriately in the research underway, be willing to share their own skills and knowledge, and in general be full scientific colleagues. If genuine openness exists, foreign visitors, including those from industry, are a valuable resource as contributors to research and as sources of knowledge about work outside the U.S.

The responsibility for ensuring that the condition of openness is met can only be carried out by individual faculty or laboratories in their selection of visitors and conduct of relationships. With understanding of this responsibility, which we believe should be reinforced by a statement of policy, we do not believe any areas of research at MIT should be prohibited from hosting visitors from abroad. Acceptance of visitors should always be at the Institute's discretion.

MIT has relatively few visitors from domestic industry who come for extended stays. We encourage the Administration to explore with American companies ways to increase such visits.

Industrial sponsors of long-term visitors are often charged a special fee, determined by host laboratories. Charging higher fees for visitors from foreign firms and governments seems to us to be an appropriate standard policy, except in special circumstances. The fee might be waived when useful to encourage more visitors from American corporations.

2. Support of Research

MIT undertakes sponsored research that advances the education and research missions of MIT, fulfills the intellectual interests of the faculty, provides an enriching experience for students, and can be freely and openly reported. In recent years, MIT has attracted research support from a number of foreign-based companies, amounting in 1990 to approximately 3% of the campus research budget, and about 20% of all industrial funding.

We believe foreign research support is fully acceptable as long as (1) the faculty has autonomy in deciding what research has scientific and technological merit, (2) the work has similar conditions of access as other research at the Institute and will be freely and openly reported, and (3) there are no atypical benefits of the results accruing to the sponsor. Such support helps to keep U.S. academic research abreast of the research frontiers of interest to foreign enterprises, provides information about the state of knowledge abroad, and helps to maintain research and education in the U.S.

In all cases, bona fide students at the Institute should be eligible for participation in research, whatever their country of origin, with the research sponsor having no say in their selection.

The Administration and faculty should be particularly sensitive to identifying research opportunities that are responsive to the needs of American industry, and be willing to offer American companies an early chance to invest in particularly promising research ideas. Consortia of companies sponsoring research that exclude participation of foreign companies raise no issues of principle as long as: other faculty outside the program remain free to pursue their research with any sponsor; the research has similar conditions of access as other research and will be freely and openly reported; and there are no non-academic restrictions placed on students who take part in the research.

3. Faculty consulting and off-campus visits

Faculty members often visit industrial sites as consultants and for research and other professional purposes. Such visits are a natural aspect of professional activity, serve as a channel for knowledge transfer to and from industry, and provide faculty members with insights into industrial problems. The dominance of domestic over foreign firms in faculty consulting with industry strongly implies that the transfer of useful knowledge through these contacts continues to be mainly to American industry.

Visits to foreign corporations, however, can be valuable to the education and research missions of MIT, as faculty surveys have shown. When such visits are part of a university (rather than private) relationship, they should be subject to the same conditions of openness in the exchange of knowledge that apply to meetings with foreign visitors on campus. Whenever possible, reciprocal visits should be built into agreements that bring visitors to MIT, as a means of gaining access to industrial laboratories in other countries that may have been inaccessible in the past.

4. Commercialization of results of research

Gaining access to research results is just one step in the commercialization of new processes or products. Of greater importance is the ability of industry to convert new ideas and information into high-quality products rapidly and efficiently. American firms in many industries are lagging behind their foreign competitors in this key dimension of performance. MIT, in cooperation with industry, has developed several programs designed to address various facets of the problem. We recommend that the President of MIT consult with industrial leaders to establish a continuing dialogue and mechanism for additional action on this issue.

It is important, however, that weakness in the translation of research to the commercial market, the causes of which in significant part lie outside the university, not be used as a reason to limit openness of university research, a step that would ultimately erode the quality of research without producing substantive benefit.

5. Gifts

The most appropriate way for foreign beneficiaries of American science and technology to contribute to the continued productivity of the research base is through unrestricted gifts that support the infrastructure of education and research. Approximately 30 of the 215 endowed chairs at the Institute have been funded by foreign-based corporations. They support the university and strengthen major areas of research, but do not direct the goals of the research, nor involve a specific quid pro quo. Accordingly, we support this policy for raising needed resources and see no reason to be concerned about the proportion of chairs funded from abroad.

6. Licensing of MIT patents, start-up companies

As part of its commitment to the transfer of technology to the community, MIT has increased the attention given to protecting and licensing intellectual property created by faculty and students. Federal guidelines mandate that licenses for patents resulting from Federally-funded research require "substantial" manufacturing of the product in the U.S. if the product is to be sold in the U.S. MIT goes further and requires that licensees of all MIT inventions be subject to the same provision. We believe this policy is an excellent one.

MIT also endeavors to help new industrial ventures based on MIT inventions, following the pattern of entrepreneurial activity that has long characterized the ethos of the Institute. New companies started by graduates and professors from MIT have contributed substantially to the U.S. economy, especially in high-technology fields. This program deserves continued emphasis.

7. The Industrial Liaison Program

The Industrial Liaison Program (ILP) was established by MIT in 1948 with the objectives of raising additional resources while encouraging the transfer of knowledge to industry. The Program has been responsible for developing many productive relationships between the faculty and industry, and currently contributes some \$3 million net to the Institute's budget. As of March, 1991, there were 245 corporate members, of which 121 were foreign, including 57 Japanese, 56 European and 8 members from other regions. Member companies are charged a fee, in return for

which they are assisted in keeping abreast of work at the Institute. The Program does not provide privileged access to work at MIT; rather, it provides more efficient access, which is the primary motive for companies to join.

We considered whether the ILP on balance may now have become a liability because of the attention resulting from foreign membership. The value of the ILP to the faculty as a vehicle for staying abreast of industrial research, the Program's usefulness in raising resources, and the fact that faculty contacts with foreign industry through the ILP are only a small portion of their contacts with American industry, argue strongly in favor of the Program and give no grounds for recommending reevaluation. In fact, we strongly encourage the development of additional participation by U.S. firms to increase the interaction between MIT research and American industry.

On similar grounds, we see no basis for establishing a limit on the proportion of foreign-based companies in the ILP nor for restricting the provision of services based on nationality.

Differential fees for foreign companies are a more appropriate means of reflecting the benefits of access to U.S. investments in science and technology. We recommend that the Administration continue its present policy of charging higher fees to foreign firms.

MIT's Tokyo office was created to redress the difficulties that distance and cultural differences pose for management of MIT's relationships in Japan, although some have seen it as causing MIT to favor Japanese companies in the ILP. Its existence offers an opportunity to assist members of the MIT community and non-Japanese members of the ILP to become more familiar with the Japanese scientific and technological community and to contribute to the Institute's research and education interests. We recommend that consideration be given to expanding its role in this way. A comparable office might also be established in Europe. Such efforts must be periodically reevaluated to assure their value is commensurate with the resources they require.

Cooperation with institutions in other countries

From time to time MIT has established programs of cooperation with universities and other institutions abroad for research or educational purposes. These programs reflect the increasing necessity to work with foreign researchers as the quality of research competence grows and becomes more widely distributed throughout the world. They are welcome as long as they contribute to research and education objectives, the faculty is fully engaged, and the quality of the cooperating institution is appropriate.

Problems may arise when the objective of a cooperative program is to serve a purpose that provides little return of a research or educational nature to the Institute. Such programs may be justified if they do not detract from the basic missions of the Institute and if adequate administrative and financial resources are available to carry them out. It is critical that there be strong faculty support and willingness to participate. Such programs deserve careful Administration scrutiny before approval.

Public service and other programs

Direct service to the nation and to the world at large, beyond contributions to education and knowledge, is, and should continue to be, an important aspect of MIT's culture. In particular, MIT's institutional capacity and its commitment to the transfer of knowledge for the benefit of society suggest a strong effort to continue to develop programs to contribute to American industrial strength. A substantial number of programs, such as the Commission on Industrial Productivity, Leaders for Manufacturing, and the MIT/Japan Program, have emerged to this end in recent years. These serve both academic and public service roles.

We also recommend attention by the Administration and Faculty to two other critical needs related to the international scene: 1) strengthening the international dimension of the undergraduate curriculum at MIT, which is increasingly important on educational grounds, and also to the needs of the nation deeply embedded in a global marketplace; and 2) contributing to the improvement of science education at primary and secondary school levels, so central to the nation's future international position.

Notwithstanding the many needs, programs that are predominantly to provide a public service, rather than a contribution to the Institute's central missions of education and research, must be undertaken with caution, and their true costs assessed; they carry the risk of detracting from those central missions which are the Institute's most important contributions to public welfare.

Process

The responsibility for the issues discussed in this report and for implementation of the recommendations lies with the senior MIT Administration and the Faculty and research staff of the Institute as a whole. We recommend designated staff responsibility in the Office of the Provost, with Faculty input on subjects involving education and research policy. The views of the Faculty Committee on International Institutional Commitments should be sought on all proposed international activities that raise significant questions. The Committee may need a revised charter and should be composed of members with substantial MIT and international experience.

The study group was composed of Eugene Skolnikoff, chair; Rudiger Dornbusch, Arnaldo Hax, Nancy Hopkins, Eric Johnson, Arthur Kerman, Philip Khoury, Richard Lester, Nicholas Negroponte, Jack Ruina, Richard Samuels, and Kenneth Smith, members; David Hart, staff.

The International Relationships of MIT in a
Technologically Competitive World

Faculty Study Group, Appointed by the MIT Provost, on the
International Relations of MIT

Eugene Skolnikoff, chair
Rudiger Dornbusch
Arnoldo Hax
Nancy Hopkins
Eric Johnson
Arthur Kerman
Philip Khoury
Richard Lester
Nicholas Negroponte
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May 1, 1991

The International Relationships of MIT in a
Technologically Competitive World

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**The International Relationships of MIT in a
Technologically Competitive World**

**Faculty Study Group, Appointed by the MIT Provost, on the
International Relations of MIT**

May 1, 1991

I. Introduction

The research universities of America provide education and scholarship of a quality that is the envy of the rest of the world. They have educated generations of students to contribute to industry, government, and to the universities themselves with advanced knowledge and skills; and they have contributed to the leadership of the U.S. in scientific and technological endeavors that have served the nation's economic, security and social purposes.

Today, there are new pressures and opportunities facing research universities. The social, economic and political setting in which they are embedded has changed dramatically, perhaps most strikingly in international affairs, as the scale of interactions among national economies and societies, the change in the security situation, and the worldwide growth of competence in science and technology have altered many traditional relationships. No country, no industry, no institution in society can ignore the effects of those transformations, nor the problems they pose for the wise conduct of affairs. Universities, with the responsibility for education for the future, must be responsive not only to what has already been experienced, but equally to the implications for tomorrow that will significantly affect all aspects of national and international affairs.

In this altered setting, universities must confront compelling new challenges. They must decide how best to prepare students for a world that is very different from that their teachers faced as students, and how to organize scholarship and education, particularly in science and engineering, in a world of intense economic competition among nations that is increasingly driven by the growing strength of science and technology abroad. As the relationship between university research and education and the nation's economic vitality seems to grow ever closer, the research

universities of the U.S. face increased scrutiny from a concerned public and may have to shoulder new and unfamiliar responsibilities. The national and international roles of these universities, in the past seen as mutually supportive, at times have the appearance of being in competition, with questions raised about the appropriate relationships that universities should have with foreign students, scholars, universities, business enterprises, and governments.

At MIT, these questions are particularly important, not only because of this institution's place among research universities, but also because of MIT's long-standing commitment to effective transfer of knowledge to the society at large, its large international student enrollment, and its extensive international ties and activities.

Accordingly, a Faculty Study Group was established in 1990 by the Provost, John Deutch, to examine the issues that are raised by this new situation, to advise the Institute Administration and Faculty on the general principles that should guide MIT's international activities and relationships, and to suggest any revisions in policies and activities that should be considered. We have interpreted our charge to focus primarily on the issues raised by the economic implications of research and education, but recognize that there are other intellectual aspects of the subject deserving attention. In particular, we consider curricular issues, especially with regard to the international dimensions of the undergraduate program, to deserve intensive consideration by the Faculty and Administration.

II. The historic relationships and principles of MIT

To establish the context for consideration of guidelines for the future, it is necessary to start from the past, to identify the important relationships and principles that have guided MIT until now.

From its establishment in 1861, MIT had a broad set of goals that emphasized both education and service to the community. Its focus was to be not only on the preeminent goal of providing the highest quality of training, but also on ensuring that technology be geared to the practical needs of society and made available for use. This stance was expressed in the original vision of MIT's founder, William Barton Rogers, and in its charter as a land-grant institution, which carried certain specific

obligations. Other public and private land-grant institutions (and other colleges as well, particularly those that grew from a religious base) share that explicit commitment to serving social needs.

The Institute recognized from its earliest days the importance of quality in its faculty and research as the key to its success in teaching and in the development of technology. It was this principle that led the Institute to be the originator of several new fields of technology, to be able to develop first-class scientific competence in the 1930s, and to be able to carry out successfully (in response to Government request) the enormous expansion of educational plant and research during the Second World War. The commitment to quality as a governing idea is deeply embedded, and it is expressed in a variety of general procedures designed to ensure the highest possible level for both faculty and students. It contributes as well to the integration of research and teaching, not only at the graduate level, but as part of undergraduate education as well.

In the conviction that open communication of the results of research is central to excellence in education, the functioning of science, and the effective transfer of knowledge, the Institute is committed to publication of all research, and to open access to the work of its laboratories and centers. Proprietary research was occasionally allowed under special circumstances at MIT before World War II, but has long since been prohibited. Classified research on the campus, which was introduced in the large wartime laboratories at the Institute, was accepted in the atmosphere of the Cold War until the 1960s. No classified research has been accepted on the campus since that time.

MIT's interest in practical applications meant that from the start the Institute had close ties to industry, and saw the transfer of knowledge from the laboratory to the world of commerce as an important operational goal. This has led to a variety of policies and activities, such as encouragement of faculty consulting for up to one day a week, faculty and student initiatives in the startup of new companies, industrial support for research, student internship programs with companies, an aggressive patent/licensing activity, the establishment of the Industrial Liaison Program in 1948,

and initiation of other industry-oriented activities.¹ MIT has incubated many institutional experiments and collaborations over the years, and its ability to respond to new problems that cross disciplinary borders often sets it apart from other universities.

The Institute has always strived for an atmosphere of non-discrimination that rejected distinctions other than those based on intellectual grounds. As an American-based institution, MIT naturally had more contacts with American industry and students than with those from other countries. However, until the Second World War, open communications with science and technology abroad, and welcoming of foreign students at MIT, proceeded without any bar. Wartime and postwar conditions altered that situation for a period of time, but recent decades have witnessed an enormous expansion of the international involvements of MIT.²

After the war, Federal funding became an important part of the financing of research at the Institute, as it did at all research universities. This funding was seen not only as a way of sustaining the research base that had been created during the war, but also as a response to the requirements of the Federal Government for research and development on subjects that the Government determined to be in the national interest. Federal support of research in the last two decades has been as high as 86% of the Institute's research budget; it has been gradually decreasing as a proportion of the total, standing at 75% in FY 1990.³ Industrial support of research is rising as a proportion of the whole, reaching about 15% in FY 1990, up from 5% in FY 1974. There is no realistic expectation, however, that industrial support can ever replace more than a portion of Federal support.

¹ A 1989 Bank of Boston study, "MIT: Growing Businesses for the Future," (Economics Department, Bank of Boston), for instance, showed that the 636 Massachusetts businesses founded by MIT-related individuals generated about \$40 billion in annual sales and employed approximately 200,000 people in the state.

² However, even in the wartime and postwar periods, the faculty was internationalized by an influx of European educators and researchers.

³ The total Institute on-campus budget has two major components: research and academic. The academic portion is provided mainly from non-government sources, including tuition, fees, endowment income, and gifts; it was \$338 million in FY 1990. The campus research budget was \$306.4 million that year.

As the postwar Federal relationship grew, MIT's traditional commitment to public service became an even more important element in the Institute's activities. Although the core of that commitment continues to be carried out through the performance of education and research at as high a level of quality as possible, there have been many examples of direct service over the years: programs to revise high school science curricula, to assist universities in developing countries, to give special attention to problems of American industrial productivity, and a wide variety of others. The largest single response to a request from the Government after the war was the agreement to found and manage the Lincoln Laboratory.⁴

III. What has changed?

The environment in which MIT has been functioning has changed in significant ways in recent years, leading to new programs and practices, and in some cases, challenging traditional principles. The most important of these changes can be briefly summarized.

First, the new level of international integration of societies and economies has been accompanied by the globalization of industry, easier and more extensive communication across borders, increased dependence within any country on developments and decisions in others, and growth of issues and technologies with worldwide dimensions. With this higher level of interdependence have come difficult international problems in economic, environmental and security areas, and a wholly new level of interaction in science- and technology-related issues across national borders.

At the same time, the level of competence in science and technology has risen markedly in most industrialized and many developing countries, so that the postwar dominance of the U.S. has significantly eroded. As a result, it is now essential for the health of science and technology in the U.S., as it was not so clearly in the

⁴ MIT continues to operate the Lincoln Laboratory, established in 1951, largely for the Department of Defense. Lincoln is part of MIT, but is outside the academic structure and the campus research budget, and classified research is conducted there. It is located in Lexington, about ten miles from the main campus. Its budget in FY1990 was \$420.1 million.

immediate postwar years, that American researchers have access to and keep abreast of research throughout the world.⁵ It also means that students must be educated to be able to engage in international exchange of knowledge, just as the faculty must have new skills for international interactions. And, it means that other nations are now much better positioned to benefit from research and development done in the U.S.

The presumption of a closer relationship than in the past between the laboratory and the commercial marketplace is another substantial shift. In the U.S., support for science has been predicated in part on the likelihood of economic benefit sometime in the future. Now, shorter product cycles, increased science-dependence of some technologies, and entrepreneurial activity of faculty and students in several fields suggest a closer, more immediate tie. The actual relationship is complex and varies among fields and technologies. Though the promise of quicker economic returns has been a spur to the support of science in the universities, it also has raised the level of concern about who has access to the research and when.

In this global, competitive, technologically-dynamic economy, American industry has not fared as well, with many exceptions, as might once have been expected, and finds itself under severe challenge from foreign industry.⁶ The reasons are complex and disputed, relating to management competence, time horizons on measurement of corporate performance, industrial structure, availability and cost of capital, training of the work force, government policy, and a host of other matters, including in particular the adeptness at translating the ideas of the laboratory into commercial

⁵ In some ways, international scientific and technological parity represents a return to the situation of the earlier decades of this century, when it was necessary to keep up with European developments in order to stay at the forefront of a field.

⁶ The casual use of "American" and "foreign" industry masks the blurring of the distinction between these terms. It is a source of dispute what meaning they have; the definitions may depend on where the primary research and development centers are located, where the maximum value-added takes place, the nationality of ownership, or where the headquarters is located. Notwithstanding the uncertainty, by and large there is still significance in where a firm's top management is located; we will continue to use that definition, recognizing it is an imperfect one. [For discussion, see Robert B. Reich, "Who is Us?," *Harvard Business Review* (January/February, 1990) and Laura D. Tyson, "They Are Not Us," *The American Prospect* (Winter, 1991).]

products.⁷

Added to the overall picture is the changing demographic situation in the U.S. that is both reducing the pool of eligible students born in the U.S. who might become engineers and scientists, and increasing the proportion of college-age Americans that come from disadvantaged educational backgrounds. The weakness of K-12 education in many parts of the U.S. has had a significant impact on higher education in science, engineering, and management. These patterns have made American research universities and industry increasingly dependent on students and trained workers from abroad who elect to remain in the country, especially those with graduate degrees. Fortunately, from this perspective, the quality of higher education in the U.S. remains attractive to students from foreign countries who, by remaining here, enhance the intellectual climate and research base.

Finally, the changing financial situation of American universities is significant. The uncertain availability of adequate public resources for research at a time of increasing educational, research, and facilities costs has led universities to mount aggressive fund-raising activities. The decline in Federal support for research equipment and facilities in recent years has increased the need to find resources to supplement, and support, those coming from public sources. For private universities in particular, the availability of resources is a matter of considerable anxiety, with little prospect that the situation will improve in the near future. The result is a continuing search for new and previously untapped sources.

In response to these developments, MIT has itself markedly evolved over recent decades, with greatly expanded international contacts and cooperation, development of research and teaching about foreign countries and international issues, attention to emerging problems of global dimensions, new educational and research programs targeted at problems in the American economy and in the transfer of knowledge, special programs to learn more from the U.S.'s primary competitors, increased efforts in domestic and international fund-raising, and innovative educational programs to prepare students for the altered international environment into which they will

⁷ A major report on this set of issues, Made in America (MIT Press), was published by the MIT Commission on Industrial Productivity (chaired by Professor Michael Dertouzos) in 1989.

graduate.

But, new questions have emerged that have not had to be posed before, or at least for which the answers previously seemed self-evident. They touch on many central, and sensitive, aspects of university life: openness of research, discrimination in access, selection of students, relationships to professional colleagues abroad, responsibility to the surrounding community, and others. All can be subsumed in the question of how, in this changed and changing environment, MIT should respond to any conflicts that may exist between its responsibilities to the nation and its role as a major participant in a worldwide scientific and technological system.

After extensive meetings, discussions and collection of data, we have formed strong views on the various aspects of this question. We have found that the principles that we believe should guide MIT's behavior are reasonably clear and deserve to be vigorously asserted. We have also found, not surprisingly, that general principles often do not give precise guidance in specific situations, or may be in conflict with each other; particular cases present awkward shades of gray, rather than black and white contrasts.

We will present first those general principles that we believe should be the primary guidelines for the international commitments and interactions of MIT. Following that, and constituting the bulk of the report, we look at more detailed aspects of MIT's international relationships, presenting our views of the policies that should govern those relationships. Finally, we offer some recommendations for the policy process at MIT that we believe to be necessary for effective implementation of our other recommendations.

IV. General principles

MIT is a research university committed to fostering education and advancing knowledge for the betterment of the human condition. It is, at the same time, a national institution rooted in American culture and traditions and an integral part of the nation's education and research system. MIT's responsibility to the nation in which it was founded and nurtured is served first and foremost by maintenance of its position as a premier institution in education and research in science and technology.

The commitment to maintain preeminence mandates that quality be a primary criterion for selection of faculty and research staff and admission of students. Compromise in that criterion in personnel decisions on grounds of nationality, source of support or other dimensions, will inescapably lead to decreased intellectual capacity and performance.

To remain a premier institution requires that MIT be thoroughly engaged in international activities in science and technology; the practice of high-quality scientific and technological research implies the ability to interact fully and openly with research wherever it is carried out. Thus, in order to fulfill its basic responsibility to the nation, it is essential that MIT maintain openness of research and education, that the Institute be an active participant in international scientific and technological communities, that faculty and research staff be able to interact freely with colleagues abroad and have ready access to research in other countries.

MIT's commitment to openness and full participation in international activities is also an expression of its responsibility to the international intellectual community that is dedicated to the free and open exchange of ideas.

Yet, many intellectually challenging and socially important problems are national, regional, or local in scope. Among the most significant is the health of the U.S. economy, which, though heavily influenced by developments in the world economy, depends ultimately on actions taken at home. MIT's intellectual focus on science and technology, its traditional commitment to effective transfer of knowledge to industry, its responsibility to the nation, and its own self-interest all dictate a vital concern with the performance of the American economy. At a time when domestic productivity growth is lagging and international economic competition is intensifying, the effective transfer of knowledge to American industry must remain an important aspect of the Institute's mission.⁸ We believe that MIT should intensify its emphasis

⁸ In recent years the Institute has undertaken a number of initiatives with the aim of improving American industrial performance. Some of the more prominent of these are the MIT Commission on Industrial Productivity, the Leaders for Manufacturing program, the MIT-Japan program, the Microsystems Technology Laboratory, the new activities of the Technology Licensing Office, the Biotechnology

on ways to contribute to the health of American industry and the U.S. economy.

Occasionally, there may be major conflicts between national and international roles. In the resolution of such conflicts, we believe the Administration, with the advice of the Faculty, should give primary weight to the general responsibility to the nation.

In carrying out its various missions, MIT must also recognize the principle that the Institute's education and research activities, whether national or international, should be solidly based in faculty interest. As with all universities of quality, it is the scholarly and entrepreneurial enthusiasm that wells up from the faculty that leads to successful programs, not those designed from above or outside. The MIT Administration can create a climate that encourages programs that serve broader societal objectives, but cannot lead the faculty where it has no intellectual interests.

To be able to carry out its missions it is essential that the Institute maintain an adequate resource and funding base, but the conditions under which those resources are raised must be consistent with these principles.

We believe, therefore, that the general principles that should guide MIT's international activities are:

- 1. MIT is a research university committed to fostering education and advancing knowledge for the betterment of the human condition. It is, at the same time, a national institution rooted in American culture and traditions and an integral part of the nation's education and research system.**
- 2. MIT's responsibility to the nation in which it was founded and nurtured is served first and foremost by maintenance of its position as a premier institution in education and research in science and technology.**

Process Engineering Center, and the Laboratory for Manufacturing and Productivity. A new Institute-wide program on productivity and industrial performance will continue the work of the Productivity Commission. For details on many of these initiatives, see section V.D below.

a. To remain a premier institution requires that MIT be thoroughly engaged in international activities in science and technology; it must be a full participant in the world trade in ideas.

b. The commitment to excellence requires that quality be a leading criterion in the selection of faculty and research staff and admission of students, and that solid faculty interest be a prime requirement for the establishment of new programs.

c. Openness of research and publication at MIT must be maintained to enable the most effective conduct of scientific and technological research and education, to permit the faculty to interact fully with colleagues abroad, and to fulfill MIT's responsibility to the international intellectual community that derives from the dedication of that community to the free and open exchange of ideas.

3. In the resolution of major conflicts between MIT's national and international roles, the Administration, with the advice of the Faculty, should give primary weight to the general responsibility to the nation.

4. The traditional commitment of MIT to the transfer of knowledge to the community at large should be intensified, with expanded emphasis on the ways the Institute can contribute to the health of American industry and the U.S. economy.

5. The Institute depends on adequate resources to carry out its activities and execute its programs, but conditions under which those resources are obtained must be consistent with these principles.

V. Specific international relationships

A. International students, alumni, and faculty

We have chosen to address questions raised by the presence of substantial numbers of international students and faculty at MIT (and of alumni abroad) first since education is central to MIT's mission. This is not, however, the area in which the deepest conflicts of principle are likely to arise.

1. Undergraduate students

The primary goal of the undergraduate program is education, although undergraduates also take an active part in research at MIT. International students provide a degree of diversity which we believe is today an essential aspect of the educational experience of MIT undergraduates.

As of December, 1990, international students comprised 8.7% of the undergraduate population.⁹ This proportion is up from 5.2% ten years ago. The undergraduate admissions process establishes a separate category for international applicants. A restricted number of places is allowed for this group of applicants, with a target of about 8% of the incoming class. The competition for admission within this pool is fierce, with less than 5% of these applicants being accepted last year. The target for acceptances is set by the Faculty Committee on Undergraduate Admissions and Financial Aid and has not been revised in recent years. The growth in the proportion of international undergraduates has been within the limits set in the past, but is now pressing these limits.

The debate about the appropriate proportion of international students to admit to the undergraduate population at MIT has a long history. If the number of international students were too small, the undergraduate educational experience would be insufficiently rich to prepare students well for effective participation in an increasingly interdependent world. In addition, too few opportunities might be offered to those with outstanding potential from outside the U.S. who would benefit from an MIT education. On the other hand, if the number of international students were too large, MIT would not be serving the nation as well as it should through the education of American citizens to meet the needs for trained scientists, engineers, managers, and other personnel. "Too few" and "too large" cannot be quantified in any precise fashion, but we believe the proportion of international undergraduates is about right.

⁹ The figure of 8.7% includes Canadian and Mexican citizens, but not permanent foreign residents of the U.S., following the procedures of the MIT International Students Office. However, Canadian and Mexican citizens are included in the domestic pool for undergraduate admissions. There are currently 45 Canadian and 20 Mexican undergraduates.

Undergraduate tuition covers only about one-third of the total cost of education, the remainder being made up from endowment income, fees, and other sources, including some Federal support. We therefore considered the possibility of raising the tuition of those international students who are able to pay, so that they would pay a larger fraction of the true cost of education and not receive an indirect MIT subsidy. Such a policy, however, would have only minor financial effects and would send a strong message abroad that would be likely to deter applications from less well-to-do foreign students. As a result, MIT would lose an important source of the diversity it seeks in recruiting abroad, and the policy of differential tuition would be counterproductive. We therefore rejected this proposal.

At present, financial need is assessed after admission, with all admitted applicants treated identically even though financial need of international students is harder to determine. Aid policies are uniform, except for those Federal assistance programs that are limited to American citizens. We believe that such Federal incentives for Americans to study science and engineering are appropriate, but also that nationality-blind provision of financial aid should be maintained.

Our conclusions are:

1. **International students provide an essential element of diversity in the undergraduate student body; the present proportion of international undergraduates appears to be about right.**
2. **Federal assistance programs that are limited to American citizens for undergraduate study are appropriate, but MIT's nationality-blind tuition structure and provision of financial aid should be maintained.**

2. Graduate students

At the graduate level in science and engineering, research and education become essentially indistinguishable. Academic quality, based on preparation and likelihood of contributing to research, should continue to be the overriding criterion for admission.

International students constituted about 33% of MIT's graduate student population at the end of 1990, among the highest in the nation. This proportion compares with about 26% a decade ago. In many areas of study, however, MIT's international population is not unusually large. About 40% of the MIT doctorates awarded in engineering, for instance, are received by students who are not citizens, a figure that is somewhat less than the national average. The distribution of international students across the graduate fields of the Institute is quite uneven. In the sciences, for example, international students make up about 34% of the graduate student population in physics, 55% in math, but only 14% in biology. In engineering, international students comprise 25% of the graduate student population in electrical engineering and computer science (EECS), 50% in nuclear engineering, and 56% in civil engineering.

Unlike undergraduates, graduate students are admitted by a process administered by MIT's academic departments. Procedures for admission of international students vary widely. In some departments (such as biology and EECS), the number of high-quality applicants from both the U.S. and abroad is far greater than the number of places. The graduate admissions process in these cases resembles that for the undergraduate student body, in that limits (formal or informal) on admission of foreign applicants have been in place for a number of years. The proportion of international graduate students in these departments tends to be lower than the Institute average. We believe this is an acceptable means to ensure adequate opportunities for Americans, without violating the criterion of quality.

Financial aid is usually allocated by departments at the time of admission. As with undergraduate financial aid, some graduate financial aid processes tend to favor American students, in part because Federally-funded programs such as NSF fellowships and NIH traineeships are restricted to American citizens. This seems an appropriate partiality in view of the importance of encouraging greater interest among American students in graduate fields of science and technology.

Some of the recent MIT curricular initiatives designed to address American needs, often in collaboration with American industry (such as Leaders for Manufacturing, conducted jointly by the Schools of Engineering and Management), naturally target American students and raise the question of whether students from countries other than the U.S. should be admitted to these programs. We would expect

American students to be predominant among those admitted to such programs, but there should not be a prohibition on participation by international students.

Occasionally, admission of international students to specific fields of study or from particular countries may raise questions extraneous to the academic enterprise, in fields relevant to nuclear proliferation, for example. There should be a clear process in the MIT structure to which these questions can be referred for resolution. International students, as all others, once admitted should not be excluded from research and education activities on the grounds of nationality.

With regard to graduate students, our conclusions and recommendations are:

1. Limiting the proportion of international students in those fields in which the pool of qualified American and foreign applicants is very large is an acceptable policy to ensure adequate opportunities for Americans without violating the criterion of quality.
2. Financial aid policies that favor American citizens, usually mandated in Federal programs, are appropriate as a means to encourage more interest among Americans in graduate programs in science and technology.
3. Some curricular initiatives designed to address American needs, such as Leaders for Manufacturing, naturally target American students. We would expect American students to be predominant among those admitted to these programs, but there should not be a prohibition on participation by international students.
4. Occasional questions of admission of international students to specific fields or from particular countries may emerge because of issues extraneous to the academic enterprise, such as concern about nuclear proliferation. There should be a clear process in the MIT structure to which these questions can be referred for resolution.

3. Alumni

The employment of students upon graduation is a major channel for transfer of knowledge from academia to industry. Thus, MIT alumni, whether U.S. citizens or not, who join industrial firms abroad may become factors in increasing foreign

competition for American firms. Similarly, U.S. firms hire both American and international alumni, who then contribute to American competitiveness. The flow is not balanced, though; a large fraction of international students, especially those from developing countries, elect to stay in the U.S., resulting in a net inflow that is of great importance to American industry and universities and, correspondingly, often of concern to their home countries. A survey of R & D directors of high-technology firms by the National Academy of Engineering, for example, revealed that they believe their industries are dependent upon foreign talent and that this dependency is increasing. Some 60% of foreign doctoral students intend to stay in the U.S. after graduation.¹⁰

Those international students that do return home after graduation from MIT and go into industry tend to rise in their companies, with a substantial proportion becoming high officials or CEOs of their firms. Of the MIT alumni living abroad for whom records are available, some 700 out of 9000 have titles of senior officials of corporations. These individuals typically remain very loyal to MIT and retain a fondness for American life, though they obviously are applying their acquired skills for the fortunes of their firms and the welfare of their nations.

The fact that future scientific, engineering, industrial and governmental leaders of other nations have spent their formative years in this country can provide a variety of benefits to the U.S. in the general advance of science, research collaboration, business relationships, and political interests. Those benefits can be important, but they will not be uniformly realized, and in any case cannot be assured

¹⁰ National Academy of Engineering, Foreign and Foreign-Born Engineers in the U.S. (Washington: NAS, 1988), p. 3. National Research Council, Summary Report 1989: Doctorate Recipients from U.S. Universities (Washington: NAS, 1990), p. 46. The data on the rate at which international students stay in (and American depart from) the U.S. are not very complete, but the available data suggest that there has been no change in the rate over the past decade. There is anecdotal evidence that a few countries, notably Taiwan and Korea, have become better able to attract their former nationals back in recent years by providing a more congenial and productive climate for their work, but this effect may have been counteracted by an increased likelihood that students from other countries (such as China) will stay. See Michael Finn and Sheldon Clark, "Estimating Emigration of Foreign-Born Scientists and Engineers in the U.S.," unpub., Labor and Policy Studies Program, Oak Ridge Associated Universities, January, 1988, and Stephen K. Yoder, "Reverse Brain Drain Helps Asia But Robs US of Scarce Talents," Wall Street Journal, April 18, 1989, p. 1.

or measured in advance.

On balance, we believe the net flow of benefits from the training of students from abroad is strongly in favor of the U.S., particularly reflecting the importance to the American economy of international students who remain in the U.S.

The tendency of foreign students to stay in the U.S. has led to a resurgence of concern about a "brain drain" from developing countries. MIT makes little provision for tailoring its engineering and science education to the needs of those countries, which adds to the likelihood that students from those countries will be dissatisfied if they return home. In effect, MIT's education provides an incentive for them to stay in the U.S.

We do not believe that MIT should change the core of its curriculum to respond to the brain drain. The unique quality of the MIT curriculum depends on its close interaction with the cutting edge of research, which cannot be altered by fiat. In fields in which issues of particular concern to developing countries form important parts of the research agenda, such as urban studies, political science, and civil engineering, MIT does have a focus on those countries and offers relevant courses and research opportunities. But, in the majority of the fields at MIT, the domestic needs of developing countries are not directly addressed. We believe this is an appropriate policy in the light of MIT's primary missions, even though it is one that can have significant effects on developing countries. The brain drain issue is not one that can be dealt with at the level of the university, but requires attention by the U.S. Government and by the countries concerned. This is not intended to rule out special programs at MIT for developing countries as an aspect of MIT's educational and public service roles.

Our conclusions and recommendations with regard to alumni are:

1. Graduates constitute an important channel for transfer of knowledge from the university to the institutions they join, domestic or foreign. A large fraction of international students elect to stay in the U.S., and have become an essential resource for American industry and universities. Even those who return home provide long-term benefits to the U.S., as well as to their home country. On balance, the net flow

of benefits from the training of students from abroad is strongly in favor of the U.S.

2. The concern that students coming from developing countries may not return home after graduation is an important one, but we do not believe MIT should modify its curriculum in response. The brain drain is a problem primarily for the students and countries concerned, and for U.S. foreign policy.

4. Faculty

American universities have come to depend on foreign-born staff, especially in science and engineering, proportionally even more than American industry. A national survey of department heads in 1986 found that about 10% of all faculty in science and engineering were non-citizens, and many more were naturalized citizens. In 1985, 47% of junior faculty positions (under 35 years of age) on engineering faculties across the country were held by non-citizens.¹¹ At MIT, some 17% of assistant professors are not citizens or permanent residents; about 30% of all faculty members were born abroad.¹²

MIT hires faculty and senior research staff without discrimination on the basis of nationality, a policy we believe to be essential to fulfill MIT's commitment to preeminence in research. Immigration rules permit MIT to seek permanent resident status for people given faculty and senior research appointments; this status provides a strong incentive for these individuals to remain in the U.S. throughout their careers.¹³

Our conclusion with regard to faculty is succinct:

1. MIT must continue to offer faculty and research positions at the Institute on the

¹¹ National Science Board, Report of the NSB Committee on Foreign Involvement in U.S. Universities, [NSB 89-80] (Washington: National Science Foundation, 1989), p. 10. NAE, op. cit., p. 76.

¹² Indeed, 6 of the 12 members of this study group were born outside the U.S.

¹³ Regulations implementing the new immigration bill may make the employment of non-citizen junior researchers, such as postdoctoral fellows and associates, more difficult. We hope that such limitations are avoided.

basis of quality, without reference to country of origin.

B. Access to research at MIT

Research is a central mission of MIT. The majority of research underway at American universities is funded by the Federal government, and Federal funds have contributed to a considerable portion of the physical plant and research facilities. MIT is no exception. In 1990, for example, Federal funds accounted for 75% of the MIT campus research budget. Should there be, as a consequence, any conditions placed on access to this research on the part of individuals or corporations from abroad who have not contributed to the development of the research base? Some have made that argument, advocating either restrictions on access or special payments to compensate for "cream-skimming."¹⁴ The argument deserves serious consideration.

The investment of Federal funds in American research universities has been of great value to the strength and vitality of the nation. The development of a productive academic education and research system, producing graduates of quality and highly-valued research, is an American success story, which other nations have tried to emulate with mixed success. There can be no doubt that much of the past investment has already paid off handsomely. The challenge is to see that it continues to pay off in the future.

A crucial element of the vitality of the research enterprise at a university is open communication. With the spread of high-quality science and technology around the globe, open communication with foreign colleagues has become even more important. For the investment of the Federal government in university research to continue to be fully productive - and from our perspective for MIT to remain a preeminent research and education institution - openness must be maintained in the U.S. and should characterize relationships with colleagues abroad.

¹⁴ Some of the leading figures in U.S. science and technology policy have used the argument. See, for example, the speech of Frank Press, president of the National Academy of Sciences, entitled "Do the Right Thing," to the annual meeting of the Academy, April 24, 1990, and former NSF Director Erich Bloch's letter to Issues in Science and Technology (Summer, 1990), p. 12.

Along with inputs of knowledge, adequate funding is needed for the past investment in research to continue to be fruitful. MIT finds itself in a demanding financial situation, with research and educational costs increasing and much tighter sources of support, particularly from the Federal government. Compared to other leading universities, MIT is in an especially difficult bind, because its endowment is relatively small in proportion to its scale of activities, and because its emphasis on science and technology means that fields with high and rapidly rising costs are a large percentage of the budget. In this climate, MIT is making an intensive effort to raise additional income.

Other nations have undoubtedly benefited and still benefit economically from the American investment in science and technology. Indeed, their ability to do so was an explicit objective of U.S. foreign policy for many years after World War II. (The U.S., we note, benefited in a similar way from the science and technology investments of European nations made before the war.) As beneficiaries of past investments, we think it appropriate - and indeed necessary - that foreign firms and nations help to ensure that the research base is maintained by adding money as well as knowledge to it.

This is not to meant suggest that most of the economic benefits of MIT research flow abroad. Preliminary results of a recent survey of the faculty and research staff suggest that the preponderance of their formal and informal contacts with industry is with U.S.-based corporations. About three times as many personal contacts were reported with U.S. firms than with either Western European or Japanese firms, for instance.¹⁵ Proximity and cultural factors also help to make the transfer of knowledge in these much more numerous contacts easier and more effective with American firms than with foreign firms, other factors being equal.

Nonetheless, we have no doubt that MIT's international relationships that provide access to research are growing. The implications of those relationships can best be assessed, understood, and responded to by considering the specific characteristics of

¹⁵ This survey was conducted under the auspices of the study group by Professors Richard Samuels and Eleanor Westney with a grant from the Sloan Foundation. Final results will be published in the near future.

each.

1. Visiting faculty, post-docs, and research scientists

A particularly important route for learning about research at MIT is through visits to faculty and laboratories. Visitors not only can gain access to research results in preliminary and prepublished form, they also can learn about the direction of research and about more intangible aspects of processes and techniques.

The most effective transfer of knowledge usually occurs in the course of long-term visits (a semester or more) where the understanding of the subject is equivalent and the MIT and outside researcher are working toward similar goals. Faculty routinely invite long-term visitors to the Institute on the basis of their knowledge and expertise, both to contribute to research projects and to learn from their stay. In some fields, in fact, post-doctoral experience is considered to be an essential qualification for research and academic positions.

Openness in the exchange of knowledge should be a condition for all long-term visits to MIT, and should be especially observed when university research is close to industrial practice. This is not a condition that can be defined with precision, or be fully assured in advance of a visit. Essentially, it means that the host should have a realistic expectation that visitors will participate appropriately in the research underway, be willing to share their own skills and knowledge, offer seminars or other opportunities for presenting work being carried on elsewhere, and in general be full scientific colleagues without constraint.¹⁶

If genuine openness exists, foreign visitors, including those from industry, are a valuable resource both as contributors to research and as sources of knowledge about work outside the U.S. Preliminary results of the faculty survey cited above show that about 25% of the respondents believed that their research benefited from interactions

¹⁶ It is worth noting that American parochialism is a factor that inhibits learning about the work of others outside the U.S. The NIH (not-invented-here) syndrome can still bedevil the acquisition of knowledge from willing visitors, in the outdated belief that research in other countries couldn't be equivalent to that in the U.S.

with companies based in Western Europe; an equal number responded similarly with regard to Japanese corporations. Restrictions on visitor access from abroad would impair this increasingly important source of ideas and skills.

The responsibility for ensuring that the condition of openness is met can only be carried out by individual faculty or laboratories in their selection of visitors, and in the conduct of relationships once they are here. With understanding of this responsibility, which we believe should be reinforced by a statement of policy from the Administration, we do not believe any areas of research at MIT should be prohibited from hosting visitors from abroad if the faculty wish. Acceptance of visitors should always be at the Institute's discretion.

Short-term visits in which the visitor is not deeply versed in the area of interest will not result in a significant transfer of knowledge beyond what is generally available through publications and conferences. Such visits would not be expected to be fully equivalent in the flow of information between the participants. On the other hand, even short visits to a laboratory can elicit considerable detailed technical information of potential commercial value if a visitor is well-qualified and prepared, and interested in specific MIT material; in those cases, faculty should be conscious that it is their prerogative to insist on more than a one-sided conversation.

MIT has many visitors, both short and long-term. Because the Institute is highly decentralized, a complete count of these visitors is not available. The Institute does track those with appointments and those foreign visitors for whom contact with the State Department is necessary. There are 84 visiting professors, for example, of whom 28 (33%) are foreign. Of the roughly 1250 foreign scholars on-campus in the current academic year (including professors, visiting scientists and engineers, post-docs, research affiliates, and others), only 91 were paid fully or partially by foreign industrial firms.

While this indicates that most of the visitors from abroad are not from foreign industry, but from universities, governments, and other organizations, there are

probably more long-term visitors at MIT from foreign than from domestic industry.¹⁷ This is apparently because of a different, and lesser, valuation placed by American industry on the knowledge and skills that can be gained from such extended visits. In our meetings, we heard of a distressing number of unsuccessful efforts by MIT faculty to induce American companies to send staff for extended visits to promising technical programs. Many of these programs then elicited considerable interest from foreign firms. We recommend that the faculty continue to seek American industrial involvement in their laboratories, and we encourage the Administration to explore additional efforts to encourage long-term visitors from American industry.

Industrial sponsors of long-term visitors are often charged a special fee by host laboratories at the Institute; the decision to levy such a charge and determination of its scale are left to the individual laboratories. A standard policy of charging a higher fee to visitors from foreign firms and governments seems to us to be appropriate, except in special circumstances, on the grounds that they are benefiting from current and prior investments made by American sources. In those cases in which it has been difficult to attract visitors from American corporations, there should be a willingness to waive an American company's fee if that would serve to encourage greater response.

At times there may be some research areas, for example those raising concerns over proliferation of weapons, in which the participation of non-American visitors might raise questions that are not strictly related to academic pursuits. These situations are likely to be quite rare, but when they arise should be dealt with through an established Institute procedure.

Our conclusions and recommendations with regard to visitors to MIT are as follows:

1. Long-term visitors are normally invited to the Institute to participate in research programs on the basis of their knowledge and expertise relevant to the research objectives of faculty and laboratories. Openness in the exchange of knowledge should

¹⁷ There is no central apparatus at MIT that tracks the home institution of visitors who are U.S. citizens.

be a condition for all long-term visits, and should be especially observed when university research is close to industrial practice. Acceptance of visitors should always be at the Institute's discretion.

2. The responsibility for ensuring that visitors meet the condition of openness can only be carried out by individual faculty or laboratories in their selection of visitors, and in the conduct of relationships once they are here. With understanding of this responsibility, which should be reinforced by a statement of policy from the Administration, we do not believe any areas of research at MIT should be prohibited from hosting visitors from abroad if the faculty wish.

3. Short-term visits are generally of lesser concern with regard to the transfer of knowledge, but when a visitor is in a good position to gain valuable technical information, the faculty or research staff member has the prerogative to insist on more than a one-sided conversation.

4. A standard policy of charging a higher fee to visitors from foreign firms and governments seems to us to be appropriate, except in special circumstances. The distressing difficulty of stimulating long-term visitors from American corporations may dictate a willingness to waive fees for them. The Administration should consider additional means for encouraging more long-term visitors from American corporations.

5. As with international graduate students, occasional issues extraneous to academic pursuits may arise in specific fields or with regard to visitors from particular countries. There should be a clear process in the MIT structure to which these questions can be referred for resolution.

2. Support of research

MIT undertakes sponsored research that advances the education and research missions of MIT, fulfills the intellectual interests of the faculty, provides an enriching experience for students, and can be freely and openly reported. One of the key elements in the strength of American research universities, by comparison with those in other countries, has been their commitment to the integration of research and education.

In recent years, MIT has attracted research support from a number of foreign-based companies. In 1990, approximately 3% of the campus research budget came from these sponsors.¹⁸ This constitutes about 20% of all industrial funding.

Although industrial support of research is only 15% of research support at MIT, and foreign support of research is only a fraction of that, concern has been raised as to whether foreign support diverts the direction of research to problems defined by foreign, rather than American, industry. There is no doubt that there are complex interactions between the availability of funding and the setting of research objectives. But, as long as (1) the faculty has autonomy in deciding what research has scientific and technological merit, (2) the work has similar conditions of access as other research at the Institute and will be freely and openly reported, and (3) there are no atypical benefits of the results accruing to the sponsor, foreign research support is fully acceptable. In fact, such support provides mutual benefit to all parties for it helps to keep U.S. academic research abreast of the research frontiers of interest to foreign enterprises, provides information in the process about the state of knowledge abroad, and helps to maintain research and education in the U.S.¹⁹

In our view, therefore, foreign sources of support for research are as appropriate as domestic, as long as they satisfy the standards for all research sponsorship; indeed, such support adds to the U.S. research effort. While they may have early access to the results (at the same time as a faculty member's normal communications with colleagues in the same field), sponsors cannot restrict dissemination of research results beyond a brief delay for consideration of protection of intellectual property. Early access to research results may provide a small commercial advantage, but it is rarely decisive, as many cases discussed in Made in America demonstrate. Provision for licensing of any resulting MIT patents are subject to negotiation at the time of the establishment of the research contract. Any such licenses would be subject to

¹⁸ These figures refer only to projects with single sponsors. We estimate that inclusion of multiple-sponsor projects would add 1-2% to the foreign share of all on-campus research sponsorship at MIT.

¹⁹ Many faculty have observed that funding from foreign sources often comes with fewer strings and reporting requirements than does support from U.S. sources.

the "substantial U.S. manufacture provision," as are all MIT licenses (see below).

In all cases, bona fide students at the Institute should be eligible for participation in research, whatever their country of origin, with the research sponsor having no say in their selection. To our knowledge, no foreign sponsors have requested such authority. Long-term visitors to the Institute arranged as part of research support should meet the same conditions as all such visitors.

In the context of MIT's broader responsibilities to the nation, the Administration and Faculty should be particularly sensitive to identifying research opportunities that are responsive to the needs of American industry, and be willing to offer American companies an early chance to invest in particularly promising research ideas. Occasionally, in developing projects intended to contribute to American industrial objectives, consortia of companies are formed to provide research funding that exclude participation of foreign companies. Such programs provide important ways to fulfill MIT's national responsibilities and raise no issues of principle as long as:

- a. other faculty outside the program remain free to pursue their research with any sponsor, even if the subject is similar to, or in competition with, that of the program;
- b. all the resulting research has similar conditions of access as other research at the Institute and will be freely and openly reported; and
- c. there are no restrictions other than academic placed on students who take a part in the research.

Our conclusions and recommendations on the international issues that arise with regard to the support of research are as follows:

1. MIT undertakes sponsored research that advances the central missions of the Institute, fulfills the intellectual interests of the faculty, enriches student experience, and for which results can be freely and openly reported. Foreign sponsorship of research is entirely appropriate and provides mutual benefits, as long as it contributes to MIT's education and research missions and satisfies all other relevant criteria, such

as standard conditions of access to research in progress and open reporting of research results.

2. All bona fide students should be eligible to participate in any MIT research, without reference to country of origin, and with no say in their selection by research sponsors. Long-term visitors to the Institute arranged as part of research support should meet the same conditions as all such visitors.

3. The Administration and Faculty should seek opportunities, consistent with MIT research interests, to engage in research that is responsive to the needs of American industry, and be willing to give American firms an early chance to invest in promising new research ideas. That may at times involve exclusion of foreign firms from research consortia; such programs of limited sponsorship provide important ways to fulfill MIT's national responsibilities and raise no issues of principle, as long as they do not constrain the research interests of other faculty or their freedom to work with other sponsors, and satisfy all other criteria relevant to any research sponsorship.

3. Faculty consulting and off-campus visits

In addition to meeting and working with industrial visitors on-campus, faculty members often visit industrial sites. Their purposes are diverse. Some are consultants, in accordance with the MIT "day-a-week" rule, serving their individual professional goals. Some have been invited because a corporation is supporting a research project, or has donated the chair held by the faculty member. Others are meeting with scientific colleagues to exchange information. Still others may be conducting research.

These visits are a natural aspect of an MIT appointment and serve to stimulate professional development, provide a channel for knowledge transfer to and from industry, and give faculty members new insights into industrial problems. Preliminary survey results indicate that the vast majority (77%) of the consulting contacts of MIT faculty with industry are with American industry. The dominance of domestic firms in these consulting contacts strongly implies that the transfer of knowledge through these visits continues to be mainly to American industry.

Visits to foreign corporations, however, can be valuable to the education and research missions of MIT. For example, a 1987 survey of the faculty found that the most important correlate of faculty interest in Japanese scientific and technical literature - an increasingly important source of information - was a personal visit to Japan.²⁰ Such visits, when conducted as part of a university (rather than private) relationship, should be subject to the same conditions with regard to openness in the exchange of knowledge that apply to meetings with foreign visitors on campus.

In fact, the importance of gaining information about scientific and technological developments in other countries, particularly in industry, leads us to recommend that, whenever possible, reciprocal visits be built into agreements to receive visitors at MIT. This can assist in gaining access to laboratories, such as in Japan, that have often been inaccessible in the past.

Our conclusions and recommendations with regard to visits to industrial laboratories are:

1. Visits by MIT faculty and research staff to corporations in the U.S. and abroad are a frequent occurrence, based on a variety of university and private relationships. The dominance of contacts with American firms strongly implies that the transfer of knowledge through these visits is mainly to American industry. Those visits that are a result of university activity should be subject to the same conditions of open exchange of knowledge that apply to meetings with visitors at MIT.
2. Visits to foreign industrial laboratories and other facilities by MIT faculty and research staff can serve to increase the flow of information from abroad, which is of increasing importance to research objectives; whenever possible, such reciprocal visits should be made part of agreements to accept foreign industrial visitors at MIT.

²⁰ Samuels, Richard, and Westney, Eleanor, "Japanese Scientific and Technical Information at MIT," Center for International Studies, MIT Japan Science and Technology Program #87-01 (1987).

4. Commercialization of results of research

Access to the results of research at the university is just one, and perhaps not the most difficult, step in the commercialization of new processes or products. Of greater importance is the ability of industry to convert new ideas and information into high-quality commercial products rapidly and efficiently. Made in America provided graphic evidence suggesting that American firms in a broad range of industries have been lagging behind their competitors in other countries in this key dimension of performance. The causes are varied and are not confined to industry; universities also share some of the responsibility. MIT, in cooperation with industry, has responded by developing several programs designed to address various facets of the problem. We recommend that the President of MIT consult with industrial leaders to establish a continuing dialogue and mechanism for additional action on this issue.

It is important, however, that weakness in the translation of research to the commercial market, the causes of which in significant part lie outside the university, not be used as a reason to limit openness of university research. Openness is essential to the productivity of the research system. Restrictions on access would ultimately erode the quality of research without producing substantive benefit.

Our recommendations are:

1. **The relative weakness of the U.S. in the ability to translate research to the commercial marketplace is of great importance; the President of MIT should consult with industrial leaders to establish a continuing dialogue and mechanism for additional action on this issue.**
2. **This weakness, the causes of which in significant part lie outside the university, must not be used as a reason to limit openness of university research; that would ultimately erode the quality of that research.**

5. Gifts

The most appropriate way for foreign beneficiaries of American science and technology to contribute to the continued productivity of the research base is through

unrestricted gifts that support the infrastructure of education and research. Gifts reflect a shared vision of MIT as an independent research university and of academic freedom and integrity as major aspects of MIT's ethos. Gifts influence the direction of research in only the most general way, by strengthening a major area of research; donors do not set the problems or goals for MIT research. The Institute expects to develop a relationship, even a close relationship, with its major donors, but not one involving an explicit or implied provision of services as a quid pro quo. Chairholders may make occasional visits to corporations that donate chairs to report on research, but when doing so as a courtesy are not providing information not available to others.

In some cases, MIT has granted ILP membership for a limited period to corporations donating chairs in the hope of developing substantive relationships between faculty and corporations that are technically stimulating and might lead to sponsored research or other additional support. As long as the membership granted on this basis is limited in time, these arrangements seem to us to raise no special concerns.

In a few cases, agreements at the time of receiving major gifts have included a provision for the donor to send a visitor to a laboratory. Such visitors should be required to meet the usual criteria for visitors (as discussed above); in all cases, the acceptance of a proposed visitor should be at the discretion of MIT, and not the donor.

Approximately 30 of the 215 endowed chairs at the Institute have been funded by foreign-based corporations. We believe the emphasis on increasing endowment through the funding of faculty chairs is much to be commended, and see no reason to be concerned about the proportion of chairs funded from abroad as long as the caveats described here apply.

With regard to seeking gifts from foreign sources, therefore:

1. Unrestricted gifts from foreign sources for endowment, chairs, and other purposes are an effective means for foreign beneficiaries of American science and technology to contribute to the continued productivity of the research base from which they have benefited. The relationships that naturally develop with any substantial donor to the

Institute are equally appropriate with foreign donors.

2. Occasional arrangements for sending visitors, foreign or domestic, to the Institute in connection with a major gift raise no grounds for concern as long as the visitors meet the standards for all other visitors.

6. Licensing of MIT patents, start-up companies

As part of its commitment to the transfer of technology to the larger community, MIT has a long tradition of patenting inventions made by its faculty and students and licensing them to entrepreneurs and established industry. This tradition has been reinforced in recent years by changes in Federal policy that clarify ownership of patents for inventions made under Federal research grants. As a result, MIT has given greater attention to protecting and licensing its intellectual property.

Licensing policies can have an influence on the success of commercialization of inventions and on where the benefits are realized. Federal guidelines mandate that licenses for inventions developed with Federal support require "substantial" manufacturing of the licensed product in the United States, if the product is to be sold in the U.S. MIT goes beyond rigorous adherence to these guidelines by requiring that licensees of all MIT inventions, not just those that result from Federal support, be subject to the "substantial" domestic manufacturing provision. The policy is a practical one that increases the prospect of successful commercialization because proximity to the inventor is so important in the process. As a bonus, the policy frees MIT from the administrative headache of having to determine whether or not a given invention was supported by Federal funds in any way. In FY90, 84% of MIT licenses were with U.S. firms, 16% with foreign firms that have U.S. facilities.

Beyond licensing, MIT's Technology Licensing Office also endeavors to help in the establishment of new ventures based on MIT inventions, following the pattern of entrepreneurial activity that has long characterized the ethos of the Institute. Over the years, new companies started by graduates and professors from MIT have contributed substantially to the U.S. economy, especially in high-technology fields. Recent studies of Massachusetts and Silicon Valley attributed some 450,000 jobs

directly to such companies as Raytheon, Digital Equipment, and Hewlett-Packard. The youngest firms tend to be in the most rapidly growing, high-technology fields; for example, individuals related to MIT have started 57 software and 20 biotechnology firms in Massachusetts since 1980.²¹ This program is an important contribution to the American economy that deserves continued emphasis.

Accordingly, we recommend that:

1. The Institute should maintain its attention to protecting and licensing intellectual property. The policy to require substantial production in the U.S. of products to be sold in the U.S. is an excellent one and should remain unchanged.
2. The program to assist in launching new ventures based on MIT inventions is an important contribution to the American economy that deserves continued emphasis.

7. The Industrial Liaison Program

The Industrial Liaison Program (ILP) was established by MIT in 1948 with the objectives of raising additional resources for research and education while encouraging the transfer of knowledge to industry. The Program has been responsible for developing many productive relationships between the faculty and industry, and currently contributes some \$3 million to the Institute's budget each year (out of a total income to the Program of approximately \$8 million). Member companies are charged a fee, in return for which they are provided with assistance in keeping abreast of work at the Institute.

This assistance is provided in a number of ways: special symposia, help in organizing visits to faculty and laboratories of interest, distribution of summaries of research under way, occasional visits of faculty to company sites, and distribution of publications. The program is operated by a dedicated office, with about twenty professional Industrial Liaison Officers who are each responsible for maintaining

²¹ Bank of Boston, *op. cit.* Chase Manhattan Corporation, "MIT Entrepreneurship in Silicon Valley" (April, 1990).

effective relationships with a number of companies. As of March, 1991, there were 245 corporate members of the ILP, of which 121 were foreign, including 57 from Japan, 56 from Europe, and 8 from other countries outside the U.S. The ILP has an office in Tokyo, which was established in 1976 primarily to expand the Japanese membership in the program and now services that membership; it has also begun to provide some support to other MIT activities in Japan.

Through its activities the ILP facilitates access to MIT on the part of member companies. It does not provide privileged access; all the information available through the ILP is equally available to non-members on their own initiative. Clearly, however, there is an advantage for a company that uses the ILP to learn about research of interest and to obtain information and contact with the faculty more efficiently. It is that efficiency of access to information that is intended to be the primary motive for companies to join the program.

The faculty at the Institute generally find the ILP a useful vehicle for obtaining information from industry. They also use it to increase funds for research materials and professional travel through the program's incentive system. It cannot be said that there is always, or even usually, reciprocal exchange of knowledge during ILP-mediated visits - that is not the purpose of the program - but in fact it is often considered by the faculty to be a valuable vehicle for staying abreast of advanced industrial research. However, some ILP-mediated visits involve carefully prepared and directed industry representatives. During such visits, the faculty should recognize the importance of insisting on a genuine exchange of knowledge, as discussed earlier. ILP contacts that do involve serious, substantive transfers of knowledge will frequently evolve into another form of relationship, such as sponsored research or consulting.

Industrial contacts arranged through the ILP constitute only a small portion of all relationships between the MIT faculty and industry. In particular, the relationships with American companies are considerably more numerous through direct contacts than through the ILP. The preliminary survey data show that the faculty have five times as many contacts with U.S. firms outside the ILP as through the ILP. This explains in part why foreign companies tend to have a higher level of activity in the ILP than their American counterparts, for those companies have greater difficulty (for cultural, linguistic and geographical reasons) than American firms in developing

their own direct relationships with the faculty. American firms are more likely simply to telephone faculty members, even if they have not previously been in contact.

We considered whether the ILP may now have outlived its usefulness in the transfer of knowledge to industry and as a means of raising resources, and thus whether MIT should reevaluate the justification for the Program in today's circumstances. Its prominence in MIT's relationships with foreign corporations, which has attracted attention and criticism, is also of concern. However, the value of the ILP to the faculty as a vehicle for staying abreast of industrial research, the Program's usefulness in raising resources, and the fact that the outside criticisms of the Program do not accurately reflect the actual extent of the overall relations between MIT and American industry, argue strongly in favor of the Program and give no grounds for recommending reevaluation. In fact, we strongly encourage the development of additional participation by U.S. firms in the ILP as a way of providing additional opportunities for interaction between MIT research and American industry.

On similar grounds, we see no basis for establishing a limit on the proportion of foreign-based companies in the ILP, nor for restricting the provision of services to member companies based on nationality. Restrictions of services to a subset of companies would in many cases be impractical and undesirable to administer; a two-tier system would pose difficult client management problems at the least.

Differential fees for foreign companies are a more appropriate means of reflecting the benefits of access to the results of past U.S. investments. The fees for membership currently average \$33,000 per year for American companies, and \$46,000 per year for foreign companies. We recommend that the Administration continue to differentiate between U.S. and foreign firms in negotiating ILP fees, although we recognize that the elasticity of demand for membership is not at all clear.

We have considered the role of MIT's Tokyo office. It was created to redress the difficulties that distance and cultural differences pose for management of MIT's relationships in Japan, although some have seen it as causing MIT to favor Japanese companies in the ILP. We believe its existence offers an opportunity to increase diffusion of knowledge about the Japanese scientific and technological community. We recommend, therefore, that consideration be given to expanding the role of the MIT

Tokyo office to assist members of the MIT community and non-Japanese members of the ILP to become more familiar with science and technology in Japan and to contribute to the Institute's research and education interests. A comparable office might also be established in Europe to serve similar purposes.

Such efforts would be intended in part as a public service as well as a contribution to central MIT missions; they must be periodically reevaluated to assure their value is commensurate with the resources they require.

Our conclusions and recommendations with regard to the ILP are, therefore:

1. MIT seeks mutually-beneficial relationships through its Industrial Liaison Program (ILP). The ILP serves to raise additional resources while contributing to productive transfer of knowledge.
2. The Program is valuable to MIT and its faculty and represents only a small portion of the Institute's overall industrial relationships, which are predominantly with American industry. Accordingly, we see no reason for recommending a review of the Program, nor for restricting foreign membership or services provided to foreign members. We strongly encourage attempts to increase membership of American firms.
3. When visits organized through ILP involve carefully prepared and directed industry representatives, the faculty should recognize the importance of insisting on a genuine exchange of knowledge as discussed earlier.
4. Higher fees for foreign members of the ILP should be continued.
5. The Administration should consider expanding the role of the MIT Tokyo office to assist the MIT community and non-Japanese ILP members to become more familiar with the Japanese scientific and technological community and to contribute to the Institute's research and education interests. A comparable office might also be established in Europe to serve similar purposes. Such offices should be periodically reevaluated.

C. Cooperation with institutions in other countries

From time to time MIT has established programs of cooperation with universities and other institutions in other countries for research, education, or public service purposes. Often, these are promulgated at the department or laboratory level; sometimes they involve a broader institutional commitment. Those programs established for research and education purposes reflect the increasing necessity to work with foreign researchers as the quality of research competence grows and becomes more widely distributed throughout the world; they are to be welcomed as long as they contribute to research and education objectives, the faculty is fully engaged, and the quality of the cooperating institution is appropriate.

Problems may arise when the objective is to serve a public purpose, such as assisting a university in a developing country or contributing to the economic development of a country in the third world or in Eastern Europe. In such cases, it is essential that there should be strong faculty or research staff interest in working in the program and that adequate administrative and financial resources are available.

A potentially more serious issue arises if the program is primarily designed to serve a community abroad or to raise financial resources, for example, an executive training program in another country, and provides little return of a research or educational nature to the Institute. Such programs may be justified if they do not detract from the basic missions of the Institute while contributing resources for those missions. But it is critical that the faculty that would be involved are supportive of the program, and willing to participate in it. Such programs should be carefully scrutinized by the Administration before approval.

Our proposed guidelines with regard to cooperation with universities in other countries are:

1. The growth of cooperative relationships with institutions in other countries is in part a product of the spread of research competence and activity throughout the world. These arrangements are welcome if they advance the research and education objectives of MIT, reflect faculty interest, and involve institutions of appropriate quality.

2. Cooperative relationships with universities or other institutions abroad can also be appropriate if there is a broader public policy purpose to be served, or if they add to the resource base of the Institute, without, in either case, detracting from the basic education and research missions. Faculty interest in the programs, and their willingness to participate in them, are essential in all cases, as is adequate provision of financial and administrative resources. Such programs should be carefully scrutinized by the Administration before approval.

D. Public service and other programs

Direct service to the nation and to the world at large, beyond contributions to education and knowledge, is, and should continue to be, an important aspect of MIT's culture. There are many possibilities for future international activities to serve national and international purposes that go beyond traditional education and research roles. MIT might, for example, make an institutional commitment to assist in the regeneration of Eastern European economies, to advise a third-world country on energy-efficient technologies, or to assist in the negotiation of environmental conventions. Similar initiatives in the past have included, among many others, an African Fellows program to train senior African officials, programs to help create and staff technical universities in India, and the creation of the Center for International Studies in 1951 in response to a request from the U.S. Government.

More pertinently for this report, MIT's institutional capacity and long-standing commitment to the transfer of knowledge for the benefit of society suggest a strong effort to continue to develop programs that are intended to contribute to American industrial strength in technology. A number of large institutional commitments to support American industrial competitiveness, mentioned earlier, have emerged from Faculty and Administration initiatives in recent years. The best of these serve academic as well as public service goals. One example is the MIT Commission on Industrial Productivity, which conducted in-depth studies of eight major industries and offered a set of recommendations aimed at overcoming the slowdown in manufacturing productivity growth.²² Another is the Leaders for Manufacturing program, conducted

²² Dertouzos, et al., op. cit.

jointly by the Schools of Engineering and Management, which is intended to train a new generation of managers that understands production, a vital topic that has been slighted by higher education in the U.S. A third is the Microsystems Technology Laboratory, a \$24 million facility for chip fabrication research supported by a consortium of American firms.

A new Institute-wide research program will continue the study of productivity and industrial performance begun by the Productivity Commission. The new program will involve MIT faculty and students in a wide-ranging set of activities designed to bring the problems of American industry into the Institute's classrooms and laboratories and will introduce ideas and discoveries generated here into arenas of decision in industry and government.

An initiative of particular public policy importance - and of importance to the quality of MIT education as well - is the MIT/Japan Program, the largest program of applied Japanese studies in the U.S. It is designed to give MIT students language and cultural skills and the experience of extended work in Japan, with the intention of modifying the imbalance in the flow of scientists and engineers and scientific and technological information between Japan and the U.S. Some 250 students have completed the Program since its inception in 1981. All students participating learn the Japanese language, with additional courses preparing them for life in Japan; then, they spend a year in a Japanese laboratory as a working engineer or scientist or in a Japanese office as part of a management team. There are 46 MIT students in residence in Japan in the 1990-91 academic year, 26 in industrial laboratories, 4 in government facilities, and 16 in universities. These students will be in a position throughout their careers to provide American institutions with relatively easy access to the scientific and technological community of Japan. Since the Japanese have such access to American science and technology already, MIT/Japan students will be part of the essential communication link necessary for truly reciprocal interaction between the two countries.

This is a small start given the size of the national need, but appreciable for a single university. We hope that this program will continue to grow, and note that it has been adapted by other universities and formed the basis for a national initiative approved by Congress in 1990. MIT is considering building similar programs related to

other nations and regions.

We also recommend attention by the Administration and Faculty to two other critical needs related to the international scene, one internal and one external:

1) the international dimension of the undergraduate curriculum at MIT, which we have not discussed because of our focus on the economic/industrial aspects of MIT's international relationships, deserves sustained attention; international experience and understanding should be a more significant aspect of education not only as an essential preparation for the world that graduates in any field will face in the future, but also to enhance the contribution they can make to the economic well-being of a country deeply embedded in a global marketplace; and

2) the improvement of science education at primary and secondary school levels is so important to the nation's international position that efforts in support of that goal would be very much in the nation's, and MIT's, interest.

We believe both of these subjects deserve to be high on the Institute's agenda.

Many public service efforts are deserving of MIT's support. However, in all cases, the true costs to the Institute, in faculty and staff time as well as dollars, should be realistically assessed in advance. Programs that are predominantly to provide a public service, rather than a contribution to the Institute's central missions of education and research, must be undertaken with caution; they carry the risk of detracting from those central missions which are the Institute's most important contributions to public welfare.

Accordingly:

1. Direct service to the nation should continue to be a significant aspect of MIT's culture. It is important and appropriate for MIT actively to seek ways to contribute to national objectives, especially with respect to American industry. Several such initiatives have been undertaken in recent years, and more are planned.
2. The imbalance in the flow of scientific and technological information between the

U.S. and Japan is a major national problem. The MIT/Japan program is a significant model of an effective way to redress this problem, as would be other programs to educate more Americans with technical backgrounds to be able to recognize the value of foreign science and technology.

3. We also recommend attention by the Administration and Faculty to two other critical needs related to the international scene, one internal and one external: 1) strengthening the international dimension of the undergraduate curriculum to more effectively prepare graduates for the world they will face in the future; and 2) considering how MIT can contribute to improving science education in the primary and secondary schools.

4. When considering a public service initiative, the full costs to the primary missions of the Institute should be realistically assessed, since those missions are the Institute's most important contributions to public welfare.

VI. Process

The responsibility for the issues discussed in this report, and for implementation of the recommendations, lies with the senior MIT Administration and with the Faculty and research staff of the Institute as a whole. We recommend designated staff responsibility for the matters discussed in this report in the Office of the Provost, with Faculty input on subjects involving education and research policy. Whether in the Provost's Office or elsewhere, a staff capability to advise MIT community members about international relationships would also be of great value.

Difficult and controversial issues will frequently arise with regard to proposed international programs, activities, and relationships. The Faculty has in place a Committee on International Institutional Commitments to represent Faculty views on these matters. The Committee cannot perform the management role of reviewing every proposal that requires Administration approval, but it is essential that the views of the Committee be sought on all those that raise significant questions. The Committee may need a revised charter and should be composed of members with substantial MIT and international experience in order to play this role effectively.

In addition, we believe it is important that a program be undertaken to provide greater understanding of MIT's views of these issues in the Executive Branch and Congress of the U.S. Government, among U.S. industrial leaders, and by the American public. Opportunities for discussions of these matters with other universities, and with the professional scientific and technological community more generally, should be welcomed and encouraged.

Finally, we believe senior Institute officials, and particularly the President, should take a visible public role in discussions of these issues, and should be prominent spokesmen for American universities and for American science and technology in relationships with government, industry and universities in other countries.

Our recommendations in this area of governance are therefore:

1. The responsibility for the issues discussed in this report, and for implementation of the recommendations, lies with the senior MIT Administration and with the Faculty and research staff of the Institute as a whole.
2. The Administration should seek the views of the Faculty Committee on International Institutional Commitments regarding all proposed international programs, activities or relationships that raise significant questions.
3. A deliberate program should be undertaken to work with the Executive Branch, the Congress, industry, and the public to provide greater understanding of MIT's perspective on the issues involved in university interactions with foreign industry and institutions.
4. Senior officials of MIT should take a leading role on these issues as prominent public spokespersons for American universities and for American science and technology.

THE WHITE HOUSE
WASHINGTON

March 18, 1992

Gene
Dear Dr. Skolnikoff:

I am very sorry to have to tell you that, even though I initially accepted your kind invitation to speak at the conference **University Interactions with Industry and Foreign Governments** scheduled for April 9, 1992, at MIT, I must cancel my visit as a result of Presidential scheduling that requires me to remain in Washington on the dates in question.

I had looked forward to coming. I hope that the conference goes well.

Sincerely yours,

Alan
D. Allan Bromley
The Assistant to the President
for
Science and Technology

Dr. Eugene B. Skolnikoff
Center for International Studies
Massachusetts Institute of Technology
E51-228
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

Really sorry - but the President takes precedence!

9/25

Michelle
allowed?
DOB

Document Originally
Attached to
Following Page

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH

DOCUMENT NUMBER: 9124072

SPEECH: YES NO

FROM: EISENKRAFT, Arthur: UNITED STATES PHYSICS TEAM FOR
THE INTERNATIONAL PHYSICS OLYMPIAD

DATE OF EVENT:

LOCATION OF EVENT: UNITED STATES

TIME OF EVENT:

SUBJECT: INVITATION TO SERVE AS A MEMBER OF THE HONORARY
BOARD OF THE XXIV INTERNATIONAL PHYSICS OLYMPIAD
HELD IN 1993.

RSVP: 10/02/91

CONTACT PERSON: EISENKRAFT W-914/241-6043

CONTACT NUMBER: H-914/941-7651

INVITATION ACCEPTED? YES NO

COPIES TO: Michelle Van Clea
INTERNATIONAL/POL

REMARKS:

DATE OF LETTER: 09/13/91

DATE RECEIVED: 09/18/91

FILE: P-INVITATION-PANEL

CLOSED



United States Physics Team

for the International Physics Olympiad

American Association of Physics Teachers, 5112 Berwyn Road, College Park, MD 20740-4100

September 13, 1991

Dr. D. Allen Bromley
Assistant to the President for Science and Technology
Old Executive Office Building, Suite 358
17th & Pennsylvania Avenue, NW
Washington, DC 20506

Dear Dr. Bromley:

In the early summer of 1993, the United States will host the XXIV International Physics Olympiad. Forty countries (including the Soviet Union, China, Australia, Germany, Hungary, Poland, and Great Britain) will arrive at our shores with their top five high school physics students. These students will compete in two five-hour examinations. The theoretical exam requires students to solve three independent problems in five hours. The experimental exam requires students to complete one or two laboratory investigations in five hours. The remainder of their time in our country will be spent interacting with each other, cultivating new friendships and visiting museums and laboratories.

Professor Leon Lederman has agreed to chair this event. I have been given the responsibility of coordinating the Olympiad project. In that capacity, I would like to invite you to serve as a member of the Honorary Board of the XXIV International Physics Olympiad. As an Honorary Board member, you would lend the luster of your name to this international event. I would also hope that you might be on hand at either the opening or closing ceremonies of the Olympiad in order to award these medals or to say a few words of encouragement to these aspiring and talented physics students.

The Olympiad is both an academic and social event which helps to focus public attention on physics, reward top physics students and add some glamour to the study of physics. Our attention will be to make the XXIV International Olympiad a very visible event which can introduce the field of physics to many different groups of people. The Olympiad will be a true success if schoolchildren hearing of the Olympiad begin to dream of one day representing the United States as a high school student in an academic competition.

I am very aware of your interest in pre-college science education. In accord with that interest, I hope that you will consider accepting this position. If you have any questions concerning the position, the Olympiad, etc., please contact me (60 Stormytown Road, Ossining, NY 10562, home 914-941-7651; office 914-241-6043) or by E-mail (ae2@pinet.aip.org). I look forward to your support in making the XXIV International Physics Olympiad in 1993 an event of which the United States can be proud.

Sincerely,

Arthur Eisenkraft
Executive Director
XXIV International Physics Olympiad

Sponsors & Contributors to the U.S. Physics Olympiad Team

SPONSORS: American Association of Physics Teachers, American Institute of Physics, The American Physical Society, American Vacuum Society, AT&T Bell Laboratories, Hewlett-Packard, IBM, Office of Naval Research, Optical Society of America, Xerox Corporation

CONTRIBUTORS: Acoustical Society of America, Addison-Wesley Publishing Company, Inc., Allyn & Bacon, Inc., American Association of Physicists in Medicine, American Association for the Advancement of Science, American Astronomical Society, American Geophysical Union, Bellcore, B P Research, COMSAT Corporation, Ford Motor Company, GTE Laboratories, Inc., International Society of Optical Engineers, Janis Research Company, Inc., William J. Lehrfeld, McGraw-Hill, Inc., National Science Teachers Association, Phillips Petroleum Company, The Society of Rheology, Prentice-Hall, Inc., Saunders College Publishing, University of Maryland, W.W. Norton & Co., Westinghouse Foundation, John Wiley & Sons, Inc., Worth Publishers, Inc.

DIRECTOR: Dr. Bernard V. Khoury **ACADEMIC DIRECTORS:** Dr. Arthur Eisenkraft and Dr. Larry Kirkpatrick

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

September 26, 1991

MEMORANDUM FOR D. ALLAN BROMLEY

FROM: MICHELLE K. VAN CLEAVE *mk*
SUBJECT: INVITATION TO SERVE AS A MEMBER OF THE HONORARY
BOARD OF THE XXIV INTERNATIONAL PHYSICS OLYMPIAD

This raises some similar concerns as the United States-Mexico Foundation meeting, i.e., seeming White House imprimatur by virtue of your association. However, if other foreign government officials are expected to participate, we may (on your recommendation that this would be worthwhile) get a favorable ruling from Boyden Gray's office on policy grounds. Please let me know should you wish to pursue this further.

In discussion with AD's.

THE WHITE HOUSE
WASHINGTON

October 10, 1991

Dear Dr. Eisenkraft:

Thank you for your letter of September 13 inviting me to serve as an honorary board member for the International Physics Olympiad. Unfortunately, in my current position I do not accept such honors because of the possibility of an appearance of a conflict of interest.

I do, however, appreciate your thinking of me and will look forward with interest to hearing more about the Olympiad as it draws closer.

I offer my best wishes for a successful event.

Sincerely,

A handwritten signature in dark ink, appearing to read "D. Allan Bromley". The signature is fluid and cursive, with the first name "D." being small and the last name "Bromley" being larger and more prominent.

D. Allan Bromley
The Assistant to the President
for
Science and Technology

Dr. Arthur Eisenkraft
Executive Director
XXIV International Physics Olympiad
5112 Berwyn Road
College Park, MD 20740-4100

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9123878

SPEECH: YES NO

FROM: STOLL, Peter S.: NATIONAL SECURITY INDUSTRIAL
ASSOCIATION

DATE OF EVENT: 10/22/91

LOCATION OF EVENT: CRYSTAL CITY MARRIOTT HOTEL

TIME OF EVENT: 8:30AM-1:30PM

SUBJECT: INVITATION TO ATTEND AND PARTICIPATE IN THE NSIA
RESEARCH & ENGINEERING COMMITTEE'S 1991 ADVISORY
COUNCIL SESSION AS A REPRESENTATIVE ON THE 1991
ADVISORY COUNCIL.

RSVP: 09/16/91

CONTACT PERSON: COLONEL L.S. MAROUSEK

CONTACT NUMBER: 202/775-1440

INVITATION ACCEPTED?

YES

NO

COPIES TO: NATIONAL SECURITY
INDUSTRIAL

REMARKS:

*9/11/91 - Requested to Marousek!
mx*

CLOSED



Invitation -

Subject *Panel*

Date Sent to file _____

Post-It™ file request pad 7667

DATE OF LETTER: 08/29/91

DATE RECEIVED: 09/03/91

FILE: P-INVITATION-PANEL



NATIONAL SECURITY INDUSTRIAL ASSOCIATION

National Headquarters

1025 Connecticut Avenue, N.W.

Suite 300

Washington, D.C. 20036

Telephone: (202) 775-1440

FAX: (202) 775-1309

OFFICE OF THE
DIRECTOR

3878
M.C. Baird, Jr.
Chairman,
Board of Trustees

J. F. Caligiuri
Vice Chairman,
Board of Trustees
Chairman,
Executive Committee

F. J. Lewis
Vice Chairman,
Executive Committee

W. H. Robinson, Jr.
President

August 29, 1991

The Honorable D. Allan Bromley
Assistant to the President
for Science & Technology
Old Executive Office Bldg, Rm 360
17th & Pennsylvania Ave, NW
Washington, DC 20506

Dear Mr. Bromley:

As a senior government executive with R&D Technology interests, your participation on the NSIA Research & Engineering Committee's 1991 Advisory Council would be valuable. I invite you to attend this year's session to be held on 22 October 1991 at the Crystal City Marriott Hotel, 1999 Jefferson Davis Highway, Arlington, Virginia, from 8:30 A.M. until about 1:30 P.M., including a luncheon beginning at approximately 12 Noon. We would appreciate it if you (or your designee) would participate as a representative on the 1991 Advisory Council, which will include the attached list of other invitees.

For the past 47 years the National Security Industrial Association (NSIA) has served as a cooperative partner with government to provide industry views and advice on matters affecting national security. With global competition and dynamic changes in the world political and economic climate, this role has never been more vital and the emphasis on technology more urgent. The Research & Engineering Committee (REC) is the NSIA spokesman for R&D policy and issues from an industry perspective and the principal focus for technology.

Each year the NSIA Research and Engineering Committee (REC) invites senior executives from key government research and engineering organizations to serve on its Advisory Council to furnish guidance regarding committee activities for the forthcoming year and provide a forum for the exchange of views on major issues and concerns. Mr. Raymond F. Siewert, Acting Deputy Director, Defense Research and Engineering (Research & Advanced Technology), will again serve as the senior executive responsible for government liaison with the REC and will chair our Advisory Council Meeting.

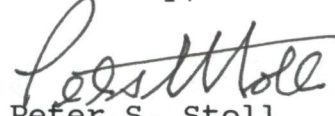
Last year REC enjoyed the largest government Advisory Council ever, with 22 senior executive-level participants from the OSD, OFPP, Military Departments, DARPA, DOC, NSF, NASA and the U.S. Congress. I have enclosed a list of the government attendees at our 1990 Advisory Council Meeting.

Page Two

The discussions were cogent and the comments of the government participants confirmed the value of an Industry/Government dialogue. Some of the topics discussed which served to guide our 1991 REC activities included Science & Technology (S&T) Strategy, the Critical Technology Plan, Technology Transfer, the impact of budget and current events on R&D, industry competitiveness, international technology strategy and much more. This year we would like to **include some of your issues and concerns on the agenda.** I invite your input by 25 September to be included in our draft agenda which I will send you before October.

We look forward to having you join us on Tuesday, October 22, 1991. Your response should be made to Colonel L. A. Marousek, USMC (Ret) at NSIA Headquarters, (202) 775-1440.

Sincerely,

A handwritten signature in cursive script, appearing to read "P. Stoll".

Peter S. Stoll
Chairman, NSIA Research and
Engineering Committee

Enclosures

PSS:as

August 30, 1991

LIST OF GOVERNMENT INVITEES
RESEARCH & ENGINEERING COMMITTEE
ADVISORY COUNCIL MEETING
October 22, 1991

Mr. Raymond F. Siewert (Chairman)
Acting Deputy Director Defense
Research & Engineering (Research
& Advanced Technology)
The Pentagon, Room 3E 114
Washington, DC 20301-3080
703/695-5036

Mr. Robert Bruce
Assistant Deputy Under
Secretary of Defense
(Int'l Technology & Trade)
The Pentagon, Room 3D 1161
Washington, DC 20301-3070
703/695-4813

Mr. David D. Acker
Professor, Engineering Management
Defense Systems Management College
Fort Belvoir, VA 22060-5426
703/664-3385

Dr. Allan V. Burman
Administrator, Office of
Federal Procurement Policy
Office of Management & Budget
Old Executive Office Bldg., Rm 350
Washington, DC 20503
202/395-5802

Mr. Arnold D. Aldrich
Assoc. Administrator for
Aeronautics, Exploration
& Technology
NASA
Washington, DC 20546
202/453-2693

The Honorable Gerald A. Cann
Asst. Secretary of the Navy for
Research, Devel. & Acquisition
The Pentagon, Room 4E 732
Washington, DC 20350
703/697-4928

Dr. Ted Berlincourt
Director, Research & Lab. Mngt.
OUSD (Acquisition)
The Pentagon, Room 3E 114
Washington, DC 20301-3080
703/697-3228

Lt. Gen. August M. Cianciolo, USA
Military Deputy to ASA (RDA)
Department of the Army
The Pentagon, Room 2E 672
Washington, DC 20310-0103
703/697-0397

The Honorable D. Allan Bromley
Assistant to the President
for Science & Technology
Old Executive Office Bldg, Rm 360
17th & Pennsylvania Ave, NW
Washington, DC 20506
202/456-7116

The Honorable Stephen K. Conver
Asst. Secy of the Army (RD&A)
The Pentagon, Room 2E 672
Washington, DC 20310-0103
703/695-6153

Dr. John C. Browne
Associate Director
Defense Research & Applications
Los Alamos National Laboratory
P.O Box 1663, MS-A110
Los Alamos, NM 87545
505/667-8682

MGEN Jerry C. Harrison, USA
Commander
U.S. Army Laboratory Command
Adelphi, MD 20783-1145
301/394-1600

Lt. Gen. John E. Jaquish, USAF
Principal Deputy Asst. Secretary
of the Air Force (Acquisition)
The Pentagon, Room 4E 964
Washington, DC 20330-1000
703/697-6363

Mr. Lionel S. Johns
Asst. Director, Energy Materials
& Int'l Security Division
Office of Technology Assessment
U.S. Congress
Washington, DC 20510-8025
202/228-6750

Mr. Richard R. Ledesma
Acting Deputy Director Defense
Research & Engineering
(Test Evaluation)
The Pentagon, Room 3E 1060
Washington, DC 20301-3110
703/695-7171

Mr. Frank Kendall, III
Deputy Director, Defense
Research & Engineering (Tactical
Warfare Programs)
The Pentagon, Room 3E 1044
Washington, DC 20301-3100
703/695-9713

Dr. Michael F. McGrath
Director, CALS
OASD (P&L) PR
The Pentagon, Room 2B 322
Washington, DC 20301-8000
703/697-0051

Mr. Martin A. Meth
Director, WSIG
OASD (P&L) (W)
The Pentagon, Room 2B322
Washington, DC 20301-8000
703/697-0051

RADM W. C. Miller, USN
Chief of Naval Research, Code 00
Ballston Center Tower #1
800 N. Quincy Street
Arlington, VA 22217-5000
703/696-4258

Dr. Victor H. Reis
Director
DARPA
3701 N. Fairfax Dr.
Arlington, VA 22203-1714
703/696-2400

VADM J. Guy Reynolds, USN
Director, Test & Evaluation &
Technology Requirements(OP-091)
Department of the Navy
The Pentagon, Room 5C 686
Washington, DC 20350-2000
703/697-5533

Dr. George R. Schneiter
Deputy Director, Defense
Research & Engineering (Strategic
& Theater Nuclear Forces)
The Pentagon, Room 3E 130
Washington, DC 20301-3090
703/697-9386

Dr. Steven P. Smith
Chief, Technol. Integration Office
Research, Development and
Engineering Center
U.S. Army Missile Command
Attn: AMSMI-RD-TI
Red Stone Arsenal, AL 35898-5240
205/876-5449

Dr. J. Daniel Stewart
Technical Director
Air Force Development Test Center
AFDTC/CA
Eglin AFB, FL 32542-5000
904/882-5558

MGEN Robert Tiebout, USMC
Commanding General
Marine Corps Research, Development
and Acquisition Command
Quantico, VA 22134-5000
703/640-2411

The Honorable John J. Welch
Asst. Secretary of the
Air Force (Acquisition)
The Pentagon, Room 4E 964
Washington, DC 20330-1000
703/697-6361

Dr. F. Karl Willenbrock
Asst. Director, Scientific,
Technological & Int'l Affairs
National Science Foundation
1800 G Street, NW, Room 538
Washington, DC 20550
202/357-7631

The Honorable
Deborah L. Wince-Smith
Assistant Secretary for
Technology Policy
U.S. Department of Commerce
14th & Constitution, Rm 4814C
Washington, DC 20230
202/377-1581

LIST OF GOVERNMENT ATTENDEES
RESEARCH & ENGINEERING COMMITTEE
ADVISORY COUNCIL MEETING
NOVEMBER 8, 1990

Mr. Raymond F. Siewert
(Chairman)
Acting Deputy Director Defense
Research & Engineering (Research
& Advanced Technology)
The Pentagon, Room 3E 114
Washington, DC 20301-3080
703/695-5036

Mr. David D. Acker
Professor, Engineering Management
Defense Systems Management College
Fort Belvoir, VA 22060-5426
703/664-3385

Mr. Charles E. Adolph
Deputy Director Defense
Research & Engineering
(Test Evaluation)
The Pentagon, Room 3E 1060
Washington, DC 20301-3110
703/695-7171

Mr. Bruce Bade
Acting Assistant Deputy Under
Secretary of Defense
(Int'l Technology & Trade)
The Pentagon, Room 3D 1161
Washington, DC 20301-3070
703/614-3219

RADM Brent M. Bennitt, USN
Deputy Director of Test &
Evaluation & Technology
Requirements (091B)
Department of the Navy
The Pentagon, Room 5C 686
Washington, DC 20350-2000
703/697-4532

Dr. Ted Berlincourt
Director, Research & Lab. Mngt.
OUSD (Acquisition)
The Pentagon, Room 3E 114
Washington, DC 20380-3080
703/697-3228

Dr. H. Lee Buchanan
Director of Defense Sciences Office
Defense Advanced Research
Projects Agency
1400 Wilson Boulevard
Arlington, VA 22209-2308
703/614-3145

Dr. Allan V. Burman
Administrator, Office of
Federal Procurement Policy
Office of Management & Budget
Old Executive Office Bldg., Rm 350
17th & Pennsylvania Ave., N.W.
Washington, DC 20503
202/395-5802

Mr. William B. Cole, Jr.
Deputy Director
Research Facilities Office
National Science Foundation
1800 G. Street, NW, Room 436
Washington, DC 20550
202/357-9785

MGEN Robert D. Eaglet, USAF
Deputy Assistant Secretary
(Management Policy & Program
Integration)
Department of the Air Force
The Pentagon, Room 4E 969
Washington, DC 20330-1000
703/697-9494

Mr. Lansing R. Felker
Dep. Director, Office of Technology
Policy Analysis & Studies
Technology Administration
U.S. Department of Commerce
14th & Constitution, Room 7413
Washington, DC 20230
202/377-0940

Ms. Christine Fisher
Chief, Support Systems and
Technology Division
OASD(P&L)PR/W
The Pentagon, Room 2B322
Washington, DC 20301-8000
703/756-8420

Dr. Alan J. Goldman
Chief, Technology Transfer Div.
U.S. Army Laboratory Command
Attn: AMSLC-TP-T
Adelphi, MD 20783-1145
301/394-2410

Dr. Leonard A. Harris
Chief Engineer for Aeronautics,
Exploration & Technology
National Aeronautics and Space
Administration
Washington, DC 20546
202/453-2697

Dr. Peter B. Lyons
Deputy Associate Director for
Defense Research Applications
Los Alamos National Laboratory
Los Alamos, NM 87545
505/667-3899

Ms. Gennie M. McBurnett
Principal Deputy Assistant
Secretary of the Navy (RD&A)
The Pentagon, Room 4E 741
Washington, DC 20350-1000
703/695-6950

Dr. A. Fenner Milton
Director of Technology
ODASA (Research & Technology)
Department of the Army
The Pentagon, Room 3E 479
Washington, DC 20310-0103
703/614-7298

Dr. Bernard H. Paiewonsky
Deputy for Technology
OASAF (Acquisition)
The Pentagon, Room 4D 977
Washington, DC 20330-1000
703/697-8331

Dr. Donald R. Ponikvar
Deputy for Directed Energy Systems
ODDDRE (Strategic & Theater
Nuclear Forces)
The Pentagon, Room 3E 136
Washington, DC 20301-3090
703/695-7327

Dr. Philip A. Selwyn
Director, Office of Naval
Technology
Chief of Naval Research
Ballston Center Tower #1
800 N. Quincy Street
Arlington, VA 22217-5000
703/696-5115

Dr. Alan Shaw
Manager, International Security
and Commerce Program
Office of Technology Assessment
U.S. Congress
Washington, DC 20510-8025
202/228-6420

Mr. David A. Vaughn
Director of Amphibious
Warfare Technology
Marine Corps Research, Development
and Acquisition Command
Quantico, VA 22134-5080
703/640-2761

"INVITATION FOR DR. D. A. HENDERSON"

TYPE: INVITATION-PANEL

DOCUMENT NUMBER: 9122840

SPEECH: YES NO

FROM: GRADISON, Bill: THE HOUSE WEDNESDAY GROUP

DATE OF EVENT: 09/21/91

LOCATION OF EVENT: THE ADMIRAL FELL INN, BALTIMORE, MD

TIME OF EVENT:

SUBJECT: INVITATION TO PARTICIPATE IN THE 1991 EDUCATIONAL
CONFERENCE TO EXAMINE U.S. COMPETITIVENESS IN THE
WORLD ECONOMY, AND LEAD THE PANEL ON THE ROLE OF THE
FEDERAL GOVERNMENT IN S&T.

RSVP: 08/09/91

CONTACT PERSON: WEDNESDAY GROUP OFFICE

CONTACT NUMBER: 226-3236

INVITATION ACCEPTED? YES NO

COPIES TO: INTERNATIONAL/POL
INDUSTRIAL
Ken Yale

REMARKS: Originally sent FYI; on 07/30/91, Dr. Bromley asked the
ADs, Steve and Sarah for their comments. On 07/31/91, Dr.
Henderson responded that he had no basis for judgment on
this invite.

CLOSED!

DATE OF LETTER: 07/23/91

DATE RECEIVED: 07/25/91

FILE: P-INVITATION-PANEL

Mary

**EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506**

July 31, 1991

NOTE FOR ALLAN BROMLEY

FROM: D.A. HENDERSON 

**SUBJECT: INVITE FROM BILL GRADISON
(Corres. Tracking #9122840)**

**I have no basis for judgment as to the desirability of
accepting this invitation. It seems to me this is a
Bromley/Yale call.**



THE HOUSE WEDNESDAY GROUP

CONGRESS OF THE UNITED STATES

386 Ford House Office Building, Washington, D.C. 20515

Office: 202-226-3236

Fax: 202-225-3637

28310
RECEIVED
JUL 25 P 2: 48

July 23, 1991

OFFICE OF THE
DIRECTOR

Dr. D. Allan Bromley
Assistant to the President for Science and Technology
Old Executive Office Building
Suite 360
Seventeenth Street and Pennsylvania Avenue, NW
Washington, D. C. 20506

Dear Allan:

On behalf of the members of the House Wednesday Group, I would like to invite you to participate in our 1991 Educational Conference to examine U. S. competitiveness in the world economy, with a focus on science and technology issues. We would like you to lead a panel that would consider the appropriate role for the federal government in science research and technology development efforts.

The conference will occur from Friday evening, September 20 until midday Sunday, September 22 at the Admiral Fell Inn, a four-diamond, luxury hotel located waterfront in Baltimore's historic Fell's Point neighborhood. On Saturday evening, there will be a social event at the Baltimore Museum of Art. Of course, we hope that you could stay with us the entire weekend.

As you may know, the Wednesday Group is a Republican caucus in the U. S. House of Representatives. Founded in 1963, the group meets weekly to discuss political and legislative issues of interest to the members. Our thirty-seven members are both ideologically and geographically diverse, and no doubt you will recognize many of the names on the enclosed membership list. Wednesday Group educational conferences give us the chance to discuss issues in a more informal and reflective manner than is often possible within the confines of the busy legislative schedule.

I anticipate that the panel session you might lead would occur mid-morning on Saturday, September 21. Other panelists will include academics and members of the business community. Your initial presentation should take about 10-12 minutes. Our Wednesday Group Executive Director, Edward Kutler has been in contact with Kenneth Yale of your office, and we understand that you may be able to join us that weekend. Please contact the Wednesday Group office (226-3236) to confirm your participation, and certainly, do not hesitate to call me with any questions you may have.

I hope that you will be able to join us for what promises to be an both an insightful and an enjoyable weekend. Again, I know that our members appreciate our educational conferences because they provide an unique opportunity spend time with important thinkers in a relaxed, informal setting. In that spirit, I look forward to seeing you at the conference.

Sincerely,

Bill Gradison
Chairman

→ Mary

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-PANEL

DOCUMENT NUMBER: 9122840

SPEECH: YES NO

FROM: GRADISON, Bill: THE HOUSE WEDNESDAY GROUP

DATE OF EVENT: 09/21/91

LOCATION OF EVENT:

TIME OF EVENT:

SUBJECT: INVITATION TO PARTICIPATE IN THE 1991 EDUCATIONAL
CONFERENCE TO EXAMINE U.S. COMPETITIVENESS IN THE
WORLD ECONOMY, AND LEAD THE PANEL ON THE ROLE OF THE
FEDERAL GOVERNMENT IN S&T.

RSVP: 08/09/91

CONTACT PERSON: WEDNESDAY GROUP OFFICE

CONTACT NUMBER: 226-3236

INVITATION ACCEPTED? YES NO

COPIES TO: INTERNATIONAL/POL
INDUSTRIAL
Ken Yale

REMARKS:

responded 7/30
Dr. Wong
Ask ADDs, Steve and Sarah re this case.

DATE OF LETTER: 07/1

FILE: P-INVITATION

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9123018

SPEECH: YES NO

FROM: GREENE, J. Morgan: U.S. PATENT MODEL FOUNDATION

DATE OF EVENT: 06/27/91

LOCATION OF EVENT:

TIME OF EVENT: 30 P.M.

SUBJECT: SELECTION OF THE NATIONAL AWARD WINNERS OF THE
INVENT AMERICA STUDENT INVENTION COMPETITION

RSVP:

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED? N YES NO

COPIES TO:

REMARKS:

6/10

Sally,

DAB is not available to do
this, would Dr. Wong be
interested?

Marian

EW - your first day
back from Norway
pls. decline EW

CLOSED

DATE OF LETTER: 06/10/91

DATE RECEIVED: 06/10/91

FILE: B-INVITATION-PANEL

(Presidential)



June 10, 1991

Dr. Allen Bromely
Assistant to the President & Director
Office of Science & Technology
Old Executive Office Building, Room 360
Washington, D.C. 20506

Dear Dr. Bromely:

I write to invite you to join a distinguished panel of judges who will gather at the Smithsonian in Washington, D.C. this June 27 to select the 1991 winners of the INVENT AMERICA! student invention competition.

Although challenging, your task will surely not be without reward! You will delight in the discovery of American ingenuity through the eyes of a child, and you will leave with a deep sense of renewed faith in our nation's future work force.

The selection of our nine national winners - one from each grade, kindergarten through eight - is the grand finale to our year-long INVENT AMERICA! education program. Launched in 1987 by then-Vice President George Bush who now serves as honorary chairman, INVENT AMERICA! was established to help children become innovative thinkers by challenging them to identify and solve problems by creating their own inventions. They learn to develop and apply math, science, language arts and creative thinking skills - skills crucial to their ability to successfully meet the challenges of today's highly complex technological world.

INVENT AMERICA! is a nonprofit endeavor, funded by such major corporate sponsors as K mart, Pepsi-Cola, Polaroid, Dow Chemical, and others interested in creating a strong, competitive work force. Their support enables us to provide schools with education materials, classroom lesson plans and activities, including our annual INVENT AMERICA! Think Link event which delivers free training and program materials to more than 50,000 educators.

This private sector sponsorship also makes possible the annual invention competition you are asked to help judge. This competition provides over \$600,000 in incentives for students, their schools and teachers through state, regional and national awards programs, including trips to Washington, D.C. to participate

10 June 1991

Page 2

in National INVENT AMERICA! week as designated by Congress. As a national jurist, you will review this year's regional winning entries to determine the 1991 finalists, or national winners who are traditionally recognized by the President during INVENT AMERICA! week in July. Selection is based on such criteria as an invention's originality and usefulness, execution of ideas, clarity of written description, illustration, etc. The judging begins with a luncheon to enable panelists to get acquainted. The selection process - a lively and informal event - will begin at 1:45 p.m. The panel should finish by 3:00 - 4:00 p.m. More information about INVENT AMERICA! is enclosed, including several examples of student entry forms from previous years.

I hope you will accept our invitation to participate as a 1991 jurist. You will be making an important contribution to this exciting program, and joining an illustrious alumni of panelists which include nobel laureates, National Inventors Hall of Fame inductees, business and education leaders, members of congress, senior White House, Library of Congress and Smithsonian officials, members of the Court of Appeals Federal Circuit and others who share the vision of a bright America through our nation's children.

Sincerely for kids and country,


J. Morgan Greene
Chairman

Enclosures
JMG/MI

The Chairman of the United States Patent Model Foundation
cordially invites you to participate
as a jurist
in the selection of the national award winners of the
1991 INVENT AMERICA! student invention competition
Thursday, June 27, 1991
at the
National Museum of American History
Smithsonian Institution
14th and Constitution Avenues, Northwest
Washington, D. C.
Presidential Suite - First Floor
Luncheon at 12:30 p.m.
Judging immediately following

R.S.V.P.

June 20, 1991

703/684-1838

J. Morgan Greene
Chairman

**INVENT
AMERICA!**

Smithsonian Project
United States Patent Model Foundation
510 King Street, Suite 420
Alexandria, VA 22314
(703) 684-1838

6/10/91

**Dr. Jerry Morgan Green
called to invite you to join a
group of judges who will be
evaluating submissions of
Young Inventors of America
scheduled for June 27
at the Smithsonian.**

**Lunch 12:30 to 1:30
Judging will start immediately
after lunch.**

**703/684-1836
Marian**

"CORRESPONDENCE TRACKING"

TYPE: INFORMATION DOCUMENT NUMBER: 9121638
ORIGINATOR: 02 STATUS C DIRECTORATE STATUS

FROM: McCRAY, Larry: COMMITTEE ON SCIENCE, ENGINEERING & PUBLIC
POLICY, NATIONAL ACADEMY OF SCIENCES

TO: Dr. D. Allan Bromley

DATE OF
CORRESPONDENCE:

SUBJECT: THE AGENDA AND A LIST OF PANEL MEMBERS FOR THE 06/12
MEETING OF THE PANEL ON PRESIDENTIALLY APPOINTED
SCIENTISTS AND ENGINEERS.

DIRECTORATE STAFF
ASSIGNED: ASSIGNED:

ACTION STAFF
REQUIRED: ACTION:

SENDER'S DUE DATE:
OSTP DUE DATE: STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO:

WHITE HOUSE TRACKING #: CONTACT PERSON:
REMARKS: PHONE: EXT:

OSTP RECEIVED: 06/05/91
DEPT RECEIVED:

FILE: *P* INVITATION *Panel* ~~FOLLOW-UP~~

National Academy of Sciences
National Academy of Engineering
Institute of Medicine

COMMITTEE ON SCIENCE, ENGINEERING,
AND PUBLIC POLICY

Dr. Bromley:

Attached is the agenda and a list of
panel members for the meeting on June
12 of the Panel on Presidentially
Appointed Scientists and Engineers.
Also attached is a list of items in
the agenda book sent to members of the
Panel. If you would like a copy of
any of the documents or a complete
agenda book please give our office a
call. (202) 334-2424

Larry McCray
Executive Director, COSEPUP

9121638

PANEL ON PRESIDENTIALLY APPOINTED SCIENTISTS AND ENGINEERS
Committee on Science, Engineering, and Public Policy
National Academy of Sciences
National Academy of Engineering
Institute of Medicine

AGENDA

First Meeting

Board Room
National Academy of Sciences
2101 Constitution Ave., N.W.
Washington, D.C.

Wednesday, June 12, 1991

- 8:30 a.m. Continental Breakfast
Larry McCray's Office, Room 181
- 9:00 a.m. Introductions and Opening Remarks (Board Room)
Kenneth Dam, Panel Chairman
Charge to the Panel
Frank Press, President, National Academy of Sciences
David Z. Robinson, Executive Director,
Carnegie Commission on Science, Technology, and Government
- 9:30 a.m. Problems and Possible Solutions in Attracting High-Quality Scientific and
Technical Talent to Presidentially Appointed Positions
Chase Untermeyer
Assistant to the President and Director of Presidential Personnel
 **D. Allan Bromley**
Assistant to the President for Science and Technology
Questions and discussion
- 10:45 a.m. Break
- 11:00 a.m. Organizational Context and Resources for the Study
Lawrence McCray, Executive Director
Committee on Science, Engineering, and Public Policy (COSEPUP)

AGENDA

PANEL ON PRESIDENTIALLY APPOINTED SCIENTISTS AND ENGINEERS

Page - 2

- 11:10 a.m. Discussion of Study
- charge to the committee
 - audience for report
 - scope of study
 - key statistics on recruitment and turnover
 - data-gathering strategies (interviews, individual/group; presentations at committee meetings; case studies of positions or agencies, requests for data or data analyses from White House or agencies; background papers)
- 1:00 p.m. Discussion of Disincentives to Taking Top S&T Jobs
- lower prestige
 - increased public exposure and loss of privacy (fuller FBI checks, closer scrutiny in Senate confirmation hearings, financial disclosure rules, more press attention)
 - reluctance to leave research for policy and administration work
 - stricter conflict of interest rules and higher costs of compliance (e.g., resignation, divestiture)
 - wider pay gap
 - increasing length and paperwork burden of appointment process
 - stricter post-employment restrictions
 - political preconditions ("litmus test")
 - inadequate pre-inauguration planning by new administrations
 - others?
- 2:00 p.m. Committee Business
- future meeting dates and locations
 - who to invite to future meetings
 - staff and committee member assignments (papers, interviews, site visits, case studies, etc.)
- 3:00 p.m. Improving the Presidential Appointments Process
- Elliot L. Richardson**
Former Cabinet member
and member, National Commission on the Public Service
- 4:00 p.m. Final Discussion
- 4:30 p.m. Adjourn

PANEL MEMBERSHIP
BACKGROUND ON THIS STUDY

1

BACKGROUND ON THE ACADEMIES AND
COSEPUP

2

"SCIENCE SIXTY" PROJECT OF THE COUNCIL
FOR EXCELLENCE IN GOVERNMENT

3

KEY SCIENCE AND TECHNOLOGY POSITIONS

4

STATEMENTS OF THE PROBLEM

5

CONSEQUENCES OF SCIENTISTS AND
ENGINEERS RECRUITMENT PROBLEMS

6

RECOMMENDATIONS OF OTHER
COMMISSIONS FOR IMPROVING THE
PRESIDENTIAL APPOINTMENT PROCESS

7

BIBLIOGRAPHY

8

MEMBERS CONFIRMED
(as of May 23, 1991)

Panel on Presidentially Appointed Scientists and Engineers

Kenneth W. Dam, CHAIR. Vice President, Law and External Relations, IBM.
[Deputy Secretary of State, 1982-1985; Provost, University of Chicago, 1980-1982.]

William T. Coleman, Jr., Senior Partner, O'Melveny & Myers, Washington, D.C.
[Secretary of Transportation, 1975-77]

John M. Deutch, Institute Professor of Chemistry, M.I.T.
[Provost, MIT, 1985-1990; Under Secretary, 1979-1980, Acting Assistant Secretary for Energy Technology, 1979, Director, Office of Energy Research, 1977-1979, Department of Energy.]

John S. Foster, Jr., TRW Inc.
[Vice President for Research and Technology, TRW Inc., 1979-1988; Director, Defense Research and Engineering, Department of Defense, 1965-1973.]

E. Pendleton James, Pendleton James & Associates.
[Director of Presidential Personnel, 1981-1982.]

G. Calvin Mackenzie, Professor of Government, Colby College.
[Director, Presidential Appointee Project, National Academy of Public Administration, 1984-1985; author, *The Politics of Presidential Appointments*, 1981, and editor, *The In-and-Outers: Presidential Appointees and Transient Government in Washington*, 1987.]

Robert C. Seamans, Jr., Senior Lecturer, Dept. of Aeronautics and Astronautics, MIT.
[Dean, School of Engineering, MIT, 1978-1981; Administrator, ERDA, 1974-1977; Secretary of the Air Force, 1969-1973; Deputy Administrator, 1965-1968, Associate Administrator, 1960-1965, NASA.]

Adlai E. Stevenson III, Of Counsel, Mayer, Brown & Platt, Chicago.
[U.S. Senator, 1970-1981 (Chair, Subcommittee on Science, Technology, and Space of the Senate Committee on Commerce, Science, and Transportation, 1977-1981; Chair, Senate Ethics Committee, 1977-1979).]

J. Jackson Walter, President, National Trust for Historic Preservation.
[Director, Office of Government Ethics, 1979-1982; President, National Academy of Public Administration, 1982-1984.]

Anne Wexler, Chairman, Wexler, Reynolds, Harrison, & Schule, Inc.
[Assistant to the President, 1978-1981; Deputy Undersecretary for Regional Affairs, Dept. of Commerce, 1977-1978; personnel advisor, Carter-Mondale transition planning group, 1976-1977.]

Ambassador R. James Woolsey, U.S. Representative to the Negotiations of Conventional Forces in Europe, U.S. State Department.
[Undersecretary of the Navy, 1977-1979; General Counsel, Senate Armed Services Committee, 1970-1973.]

Staff

Lawrence McCray, Executive Director, COSEPUP

Michael McGeary, Study Director [NRC Staff Officer].

James Pfiffner, Consultant [Professor of Government and Politics, George Mason University]

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-PANEL

DOCUMENT NUMBER: 9121623

SPEECH: YES NO

FROM: DERTOUZOS, Michael L.: LABORATORY FOR COMPUTER
SCIENCE, MIT

DATE OF EVENT: 10/11/91

LOCATION OF EVENT:

TIME OF EVENT: 2:15PM

SUBJECT: INVITATION TO PARTICIPATE IN AN INTERNATIONAL PANEL
AS PART OF A TWO-DAY SYMPOSIUM, "BUILDING THE
INFORMATION MARKETPLACE".

RSVP: 06/15/91

CONTACT PERSON: DAVID MARSH

CONTACT NUMBER:

INVITATION ACCEPTED?

~~YES~~ NO

COPIES TO: Michelle Van Clea
PHYSICAL SCIENCES
INTERNATIONAL/POL

REMARKS:

6/11/91 - Regretted to Ann Wells!
mn

DATE OF LETTER: 05/28/91

DATE RECEIVED: 06/04/91

FILE: P- INVITATION-PANEL



Laboratory for Computer Science

RECEIVED

M.L. Dertouzos, Director

R.L. Rivest and A. Vezza, Associate Directors

545 Technology Square, Cambridge, Massachusetts 02139
Telephone (617) 253-2145 FAX (617) 253-8682

May 28, 1991

OFFICE OF THE
DIRECTOR

Dr. D. Allan Bromley
Assistant To The President
For Science and Technology
White House
1700 Pennsylvania Avenue
Washington D.C. 20500

Dear Dr. Bromley:

MIT is organizing a two-day symposium, "Building The Information Marketplace," for October 10 and 11, 1991. It will cover our vision of the opportunities offered by the "information marketplace", infrastructure requirements, bridging technologies, business and entertainment uses, and the social impact and legal implications. The program will conclude with an international panel discussion on "getting from here to there". A preliminary draft of the target program is enclosed, together with a recent article I wrote outlining my thoughts on the topic.

I believe that you would bring an important perspective to this event, and I hope that you will accept my invitation to participate in the international panel on the afternoon of October 11. We have taken the liberty of identifying you as a potential participant in the enclosed draft of our target program. All but two of the identified participants have already accepted, and we are anxious to have the Executive and Congressional perspectives presented by Senator Gore and yourself.

We look forward to your participation in this symposium, which will be attended by about 500 executives, educators, and government officials from the U.S., Europe and Asia. I would appreciate your response to our invitation by June 15 so that program arrangements may be finalized on time. Please contact me or David Marsh, Manager of Corporate Relations, who is in charge of organizing this project, if you have any questions or require any additional information.

Sincerely,

Michael L. Dertouzos

Enclosures

cc: David Marsh

D R A F T

BUILDING THE INFORMATION MARKETPLACE

Symposium Chairman:

Professor Michael L. Dertouzos
Director, Laboratory for Computer Science

October 10-11, 1991
Kresge Auditorium

Industrial Liaison Program
Massachusetts Institute of Technology

BUILDING THE INFORMATION MARKETPLACE

Chairman: Professor Michael L. Dertouzos
Director, Laboratory for Computer Science

ILP Representative: David Marsh
Manager, Corporate Relations

Date: October 10-11, 1991

Location: Kresge Auditorium, MIT

Computers will become a truly useful part of our society only when they are linked by an infrastructure like the highway system and the electric power grid, creating a new kind of free-market for information services. Text, pictures, movies, software, and more would move easily over such an infrastructure. Connected to all homes via fiber optics, a National Information Infrastructure would bring an entertainment library thousands of times richer than any we might own. By speeding up today's activities among the nation's firms and opening up new ones, a national information infrastructure would improve both the U.S. economy and way of life. Eventually, the information infrastructures of many nations would link up, benefiting the world as much as global transportation and telephone communications do today.

This two day symposium will present key aspects of the technological opportunities and likely consequences of such an information infrastructure. They include the infrastructure and its networking and server sub systems; the bridging software and communication conventions that enable applications to use the infrastructure; key potential business and individual uses; and the likely legal and social impacts. The program will conclude with an international panel discussion of how we get from here to there.

SYMPOSIUM AGENDA

Thursday, October 10, 1991

7:30 Registration

8:45 **Opening Remarks**

Professor Mark S. Wrighton
Provost, MIT

9:00 **THE INFORMATION MARKETPLACE**

Professor Michael L. Dertouzos
Symposium Chairman
Director, MIT Laboratory for Computer Science

Session 1: Infrastructure.

9:45 **ADVANCED NETWORKS AND WORKSTATIONS**

Dr. David L. Tennenhouse
MIT Laboratory for Computer Science

10:30 Break

10:45 **ALL-OPTICAL NETWORKS**

Dr. Vincent W. S. Chan
MIT Lincoln Laboratory

Session 2: Bridge.

11:30 **SPEECH "E-FORMS"**

Dr. Victor W. Zue
MIT Laboratory for Computer Science

12:15 Lunch

1:30 INFORMATION TOOLS FOR NETWORKS

Professor Thomas W. Malone
MIT Sloan School of Management

2:15 KNOWBOTS

Dr. Robert E. Kahn
President, Corporation for National Research Initiatives

3:00 Break

3:15 DIGITAL TELEVISION

Professor Jae S. Lim
MIT Research Laboratory of Electronics

Session 3: Uses.

4:00 MEDIA IN THE NEXT MILLENIUM

Professor Nicholas P. Negroponte
MIT Media Laboratory

4:45 Adjournment

Friday, October 11, 1991

8:30 THE INFORMATION DRIVEN CORPORATION

Professor Michael S. Scott-Morton
MIT Sloan School of Management

9:15 THE CAR AS A NETWORK NODE

Professor Daniel Roos
MIT Technology, Policy and Industrial Development

10:00 Break

Session 4: Impact.

10:15 REGULATORY IMPERATIVES

Professor Eli Noam
Columbia University

**11:00 BUILDING THE OPEN ROAD: POLICIES FOR A NATIONAL
PUBLIC NETWORK**

Mr. Mitchell D. Kapor
On-Technology

**11:45 POTENTIAL FOR EDUCATION:TAPPING THE INDIVIDUAL
AND SOCIAL MIND**

Dr. John Seely Brown
Xerox Corporation

12:30 Lunch

1:30 INFORMATION IN THE GLOBAL ECONOMY

Dean Lester C. Thurow
MIT Sloan School of Management

Session 6: Panel Discussion: "Getting From Here To There"

2:15 Panel Presentation and Discussion.

The Honorable Albert Gore, U.S. Senator
Dr. D. Allan Bromley, Assistant to the President for Science
and Technology
Dr. Alan E. Baratz, Director of High Performance Computing and
Networking, IBM
Professor Heinz Schwärtzel, Vice President, Siemens AG
Dr. Yasuo Kato, Vice President, NEC
Dean Joel Moses
Professor Michael L. Dertouzos, Panel Chairman

3:30 Break

4:30 Adjournment

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH

DOCUMENT NUMBER: 9121334

SPEECH: YES NO

FROM: MENON, M.G.K.: ICSU

DATE OF EVENT: 11/24/91

LOCATION OF EVENT: VIENNA, AUSTRIA

TIME OF EVENT:

SUBJECT: MARTI TREICHEL HAS FORWARDED THE INVITATION TO
ATTEND THE INTERNATIONAL CONFERENCE AND PARTICIPATE
IN A PANEL DISCUSSION.

RSVP: 05/13/91

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED?

YES

NO

COPIES TO: Michelle Van Clea
Thomas Ratchford

REMARKS:

DATE OF LETTER: 05/06/91

DATE RECEIVED: 05/06/91

FILE: P- INVITATION-SPEECH Panel

NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL

COMMITTEE ON INTERNATIONAL
ORGANIZATIONS AND PROGRAMS

91 MAY 6, 1991 36

TO: Dr. D. Allan Bromley
DIRECTOR
FROM: Marti Treichel

Dear Allan,

The folks at ICSU have asked
me to transmit the attached
letter to you. It is an invitation
I hope you will be able to accept.

Best regards,

Marti

9121334

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS CONSEIL INTERNATIONAL DES UNIONS SCIENTIFIQUES

Officers :

Prof. M.G.K. Menon (India), President
Prof. J.C.I. Dooge (Ireland), President-elect
Prof. W.E. Gordon (U.S.A.), Vice-President
Prof. J.W.M. la Rivière (Netherlands), Secretary General
Dr. M. Petit (France), Treasurer

JML/mb/2.42.ii



Secretariat :

Executive Secretary : Julia Marton-Lefèvre
51, boulevard de Montmorency, F-75016 Paris, France
Telephone : (33 1) 45 25 03 29 - Telegrams : ICSU Paris 016
Telex : ICSU 630553 F - Telefax (33 1) 42 88 94 31
E-mail : Omnet ICSU. Paris, ICSU @ FRMOP11.Earn Telecom Gold 10075 : DBI0126

Paris, 6 May 1991

Professor D.A. Bromley
Director and
Assistant to the President for
Science and Technology
Office of Science and Technology Policy
Old Executive Office Building, Room 360
Washington, D.C. 20506

Dear Professor Bromley,

Some weeks ago you received an invitation* from me to attend the International Conference on an Agenda of Science for Environment and Development into the 21st Century (ASCEND 21) (24-29 November, Vienna, Austria).

The Advisory Committee for ASCEND 21 feels that it would greatly assist a successful outcome of the Conference if you were able to participate, at least on the opening day (Monday, November 25th), although of course your presence for a longer period would also be much appreciated. The opening session on the morning of that day will be devoted to addresses by representatives of the organizers and one or two selected key-note speakers. The afternoon will be devoted to parallel Working Sessions on Themes 1 to 5. In the evening it is proposed to hold a 2 1/2 hour panel discussion on the Theme of "Science for Environment and Development". The Advisory Committee would be most appreciative if you were available to take part in that panel discussion. This would involve making one of five or six 15 minute presentations and taking part in the subsequent general discussion.

I realize that there are many demands on your time but feel that you are particularly qualified on the basis of your own experience to contribute substantially to the panel discussion and in setting a tone and context for the work of the Conference.

May I request that you respond by telefax, telex or electronic mail within the next few days.

With best regards,

Yours sincerely,

M.G.K. Menon
President, ICSU

* sent to you at Yale University address; another copy is attached.

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS CONSEIL INTERNATIONAL DES UNIONS SCIENTIFIQUES

Officers :

Prof. M.G.K. Menon (India), President
Prof. J.C.I. Dooge (Ireland), President-elect
Prof. W.E. Gordon (U.S.A.), Vice-President
Prof. J.W.M. la Rivière (Netherlands), Secretary General
Dr. M. Petit (France), Treasurer



Secretariat :

Executive Secretary : Julia Marton-Lafèvre
51, boulevard de Montmorency, F-75016 Paris, France
Telephone : (33 1) 45 25 03 29 - Telegrams : ICSU Paris 018
Telex : ICSU 630553 F - Telefax (33 1) 42 88 94 31
E-mail : Omnet ICSU, Paris, ICSU @ FRMOP11.Eam Telecom Gold 10075 : DB0126

MGKM/mb/2.42.11

Prof. D.A. Bromley
Wright Nuclear Structure Laboratory
Physics Department
Yale University
272 Whitney Avenue
New Haven CT 06511
U.S.A.

Paris, 16 April 1991

Dear Professor Bromley,

You are undoubtedly aware that there will be a major UN Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil in June 1992. The International Council of Scientific Unions has agreed to be the principal scientific advisor to this Conference. A major part of ICSU's task in this connection is the organization of a scientific conference which has been named the *International Conference on an Agenda of Science for Environment and Development into the 21st Century (ASCEND 21)*. Documentation describing this Conference is enclosed with this letter.

The Bureau of the Advisory Committee for the ASCEND 21 Conference invites you to participate in the Conference. Attendance at this Conference is by invitation only, and each of the 200 attendees is invited in his or her personal capacity.

You will note that the ASCEND 21 Conference is essentially a Working Conference aimed at developing strategies for the future. Reviewing the past will be undertaken only to the extent that it will help in this task.

It will be assumed that all participants are able to read and understand English. Thus all written material and all verbal presentations will be in English. However, simultaneous interpretation services, in English, French and Spanish will be made available during discussion periods, so that those more comfortable in French and Spanish may express themselves freely. In the first instance the Conference proceedings, which will include the final written papers, will be published in English. Translations into other languages may follow in due course.

Funds are available to support travel and living expenses of participants from developing countries. We trust that other participants will be able to find support from other sources, or that they will let us know if we can assist them in this.

I am sure that you will recognize the importance of this Conference. By participating in it, you will be able to influence the directions taken by UNCED, and the course to be followed by science for environment and development for decades to come. I urge you to accept.

Please respond by telefax, telex or electronic mail within the next few days.

I look forward to our cooperation in ASCEND 21.

Yours sincerely,

A handwritten signature in dark ink, appearing to read "M.G.K. Menon". The signature is stylized with a large, looped "M" and a cursive "Menon".

M.G.K. Menon
President, ICSU

Enclosures

THE WHITE HOUSE

WASHINGTON

June 4, 1991

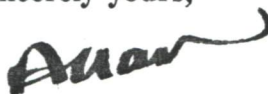
Dear Professor Menon:

Thank you for your letter of May 6, 1991, inviting me to participate in an ASCEND Conference panel discussion scheduled for November 25, 1991, in Vienna, Austria. I apologize for the much belated response.

As much as I would like to join you for what I am sure will be a most interesting session, the time period that you mention is not a good one on my schedule because I have a previous commitment of long-standing.

I appreciate your thinking of me and send my best wishes.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Allan", with a long, sweeping flourish extending to the right.

D. Allan Bromley
The Assistant to the President
for
Science and Technology

Professor M.G.K. Menon
President
International Council of Scientific Unions
51, Boulevard de Montmorency
F-75016 Paris, France

"CORRESPONDENCE TRACKING"

TYPE: ACTION ON AN INVITE

DOCUMENT NUMBER: 9120955

FROM: MALONE, Thomas: SIGMA XI, THE SCIENTIFIC RESEARCH SOCIETY

TO: DR. BROMLEY

DATE OF
CORRESPONDENCE: 03/26/91

SUBJECT: REQUEST TO RECONSIDER YOUR PRELIMINARY DECISION TO
REGRET TO THE INVITATION TO PARTICIPATE IN THE
FORUM.

ASSIGNED TO: D. Allan Bromley

ACTION REQUIRED: AS APPROPRIATE

SENDER'S DUE DATE: OSTP DUE DATE: 04/15/91

DATE COMPLETED: -----

COPIES TO:

WHITE HOUSE TRACKING #:

CONTACT PERSON:

REMARKS:

DATE RECEIVED: 04/01/91

FILE: *P-* INVITATION *Panel* ~~FOLLOW-UP~~



Sigma Xi, The Scientific Research Society

99 Alexander Drive, P.O. Box 13975 Research Triangle Park, NC 27709
Tel: (919) 549-4691 Fax: (919) 549-0090

RECEIVED

91 APR 1 P 2: 47

March 26, 1991

Dr. D. Allan Bromley
Assistant to the President
for Science and Technology
The White House
Washington, D.C. 20506

OFFICE OF THE
DIRECTOR

Dear Allan:

It was good of you to take time to write on March 3rd to describe the scheduling problems which seem to preclude your participation in our Forum. While your letter was in the mail, I had an opportunity to visit with Bill Busch and Steve Olson regarding some interesting developments in connection with the Forum in Washington in November.

As you know from the earlier correspondence I copied to your office, we have invited Mrs. Thatcher to present a major address. This was done in consultation with Sir Crispin Tickell and Alistair Allcock at their embassy in Washington. We have received an encouraging acknowledgement to our invitation. Moreover, David Pearce, Senior Advisor to Mrs. Thatcher on environmental matters, has accepted our invitation to be a speaker.

Finally, the Global Business Forum (mainly FORTUNE 500 companies) want to host a banquet in her honor in New York City immediately following the Forum. You and Bob Corell will also be invited to that event (see enclosed letter).

Allan, this letter is not intended to complicate your busy life by inviting you to reconsider your preliminary decision, but, given the uncertainties that must accompany your overseas commitments, I felt you might wish to review the situation.

Our hope -- and expectation -- is that the Forum will be a seminal event triggering unprecedented interest and activity during the decade of the 1990's by Sigma Xi and our cosponsoring organizations.

With every good wish,

Sincerely yours,

Thomas F. Malone
Forum Chairman



GLOBAL BUSINESS FORUM

March 22, 1991

The Rt. Honorable
Margaret Thatcher, O.M., F.R.S., M.P.
Conservative Central Office
32 Smith Square
Westminster
London SW1P 3HH
ENGLAND

Dear Mrs. Thatcher:

The Global Business Forum looks upon you as one of the great leaders of the twentieth century and would be very pleased if you were to accept our invitation to be the guest of honor and speaker at a dinner meeting in New York in November. The dates we would like to propose are November 18 or 19, at the Board Room of New York located at 280 Park Avenue.

The Forum is a private limited membership organization consisting of senior executives of international corporations based in Europe, North America and Japan. Enclosed please find a Forum leaflet which lists the member companies.

A primary goal of the Forum is to serve as a bridge between the business communities of North America and Europe and policy-makers as well as opinion leaders in governments, intergovernmental organizations and non-governmental organizations.

Among the Forum's recent guests have been: U.S. officials in the Departments of State, Energy and Treasury as well as the U.S. Trade Representative's Office; Congressional staff; various commissioners of the European Economic Community; heads of various United Nations organizations; and senior foreign government officials. Enclosed please find a partial list of past guest speakers.

Forum meetings are very informal. We would like to hear your views on a new world order and the respective roles to be played by the United States, the Soviet Union, the United Kingdom, the European Community and Japan. Your initial remarks would then be followed by an interchange with the Forum's executives.

Program and Management by Global Business Relations, Inc.

201 East 42nd Street • Suite 1506 • New York, New York 10017 • Telephone: (212) 983-6762 • Fax: (212) 808-0971 • Telex: 4938419 GBR UI

The Rt. Honorable Margaret Thatcher
March 22, 1991

Page Two

May I also take this opportunity as an American to thank you for your unflinching resolve and support in addressing the tyranny in the Middle East. The United States will never have a stauncher ally than the United Kingdom.

We will contact your office in mid-April and very much hope you will look favorably upon this invitation.

Sincerely,

John A. Erhardt
Executive Director

cc: Malcolm Barlow
John Aherne
U.V. Henderson

THE WHITE HOUSE

WASHINGTON

June 4, 1991

Dear Tom:

Thank you for your letter of May 2, 1991, again inviting me to address the Forum scheduled for November 16, 1991. I apologize for the much belated response.

Unfortunately, my schedule has not changed with respect to my foreign travel since we last discussed the possibility. If the situation changes I will, of course, be happy to accept your invitation and inform you immediately. I am sorry that I cannot be more specific, but I am sure that you understand my position.

With warmest best wishes,

Sincerely yours,



D. Allan Bromley
The Assistant to the President
for
Science and Technology

Dr. Thomas F. Malone, Forum Chairman
Sigma Xi
99 Alexander Drive
P.O. Box 13975
Research Triangle Park, North Carolina 27709

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9120775

SPEECH: YES NO

FROM: SILVERMAN, Gary S.: BOWLING GREEN STATE UNIVERSITY

DATE OF EVENT: 04/19/91

LOCATION OF EVENT: TOELDO, OHIO OR DETROIT, MICHIGAN

TIME OF EVENT: 11:00AM

SUBJECT: INVITATION TO BE A PANALIST ON AN INTERACTIVE
TELECAST WITH THE SOVIET UNION. TOPICS INCLUDE
TECHNICAL & POLITICAL ASPECTS OF GLOBAL WARMING.

RSVP:

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED?

~~YES~~ NO

COPIES TO: Nancy Maynard
Thomas Ratchford

REMARKS:

DATE OF LETTER: 03/13/91

DATE RECEIVED: 03/18/91

FILE: *sp.* INVITATION *Panel*

THE WHITE HOUSE

WASHINGTON

March 29, 1991

Dear Dr. Silverman:

Thank you for your letter of March 13, 1991, inviting me to participate as a panelist on a telecast with the Soviet Union. I apologize for the much belated response.

The number of requests I receive is overwhelming and growing, and I am finding it necessary to regret almost all of them. As much as I would like to join you, I must regretfully decline.

I appreciate your thinking of me and wish you success in this commendable endeavor.

Sincerely yours,

A handwritten signature in dark ink, reading "D. Allan Bromley". The signature is written in a cursive style with a prominent "D" and a long, sweeping underline.

D. Allan Bromley
Assistant to the President
for
Science and Technology

Dr. Gary S. Silverman
Director
College of Health and Human Services
Bowling Green State University
Bowling Green, Ohio 43403-0280



Bowling Green State University

RECEIVED

9/20775
Environmental Health Program
College of Health and Human Services
Bowling Green, Ohio 43403-0280
(419) 372-7774

91 MAR 18 AM 11:41

March 13, 1991

OFFICE OF THE
DIRECTOR

The Honorable D. Allan Bromley
Director, Office of Science and Technology Policy
Executive Office of the President
Old EOB 358
Washington, D.C. 20506

Dear Dr. Bromley:

I am writing to ask about your participation as a panelist on an interactive telecast we are having with the Soviet Union, or for advice about alternative representatives from your office.

On April 20, we will be conducting a two hour telecast between a class from Mendeleev Institute of Chemical Technology and a class from BGSU. Students from each country will ask questions of a panel of experts and each other. Topics will include both technical and political aspects of global warming.

This telecast will be carried on Soviet television, with an anticipated audience of over 150 million people. It may also be picked up by many PBS channels here.

The Soviets are lining up some of their biggest names to participate. They have told me that the following individuals have been invited and several will be on the panel (the spellings are my poor attempt to overcome my ignorance of the Russian language):

Velacov - Chief science advisor to Gorbachev
Yagadin - Soviet Union Minister of Higher Education
Yablacov - Head of Ministry of Environment of Congress of People's
Deputies Muscev - Science Advisor to Gorbachev, former Director of
Computer Science Ministry (or department?)
Vorontsov - Head of Committee for Environmental Protection

We are looking to provide the same level of panelists as the Soviets. Currently, we have tentative confirmation from Jerry Mahlman from the Geophysics Fluid Dynamics Laboratory/NOAA at Princeton. Bob Watson, from NASA, would like to participate, but could only give us about a 50 percent likelihood of his being able to make it. We have invited Senator Howard Metzenbaum to participate, and are waiting to hear from him. We would like to find two additional participants, and provide a balance between science and policy, official administrative positions and critics.

Bromley
3/14/91
page 2

Panelists will probably have to fly into Toledo, Ohio, or Detroit, Michigan, the evening of Friday, April 19. The broadcast will be from 11:00 - 1:00, or 12:00 - 2:00, on Saturday. Flights out of town could be done as early as 4:00 from Toledo, or 5:00 from Detroit.

We believe that it would be appropriate to have an official representative from the President's Office, and hope that you will be available.

Sincerely,

A handwritten signature in cursive script, appearing to read "Gary Silverman". The signature is fluid and extends across the width of the line.

Gary S. Silverman, D.Env.
Director

"CORRESPONDENCE TRACKING"

TYPE: INFORMATION

DOCUMENT NUMBER: 9120768

FROM: BROWN, Julian: BBC

TO: DR. BROMLEY

DATE OF
CORRESPONDENCE: 03/12/91

SUBJECT: A CASSETTE COPY OF PART OF THE INTERVIEW WITH BBC,
THAT WAS INCLUDED IN THEIR PROGRAMME, "SCIENCE NOW",
BROADCAST LAST WEEK.

ASSIGNED TO:

ACTION REQUIRED:

SENDER'S DUE DATE:

OSTP DUE DATE:

DATE COMPLETED:

COPIES TO: D. Allan Bromley
Steve Olson

WHITE HOUSE TRACKING #:

CONTACT PERSON:

REMARKS: Cassette to DAB.

DATE RECEIVED: 03/18/91

FILE: *invite Panel*
~~SEARCH - INTERVIEW~~

920768



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91 MAR 18 A10:01

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JB/rs

12th March 1991

Dr. Allan Bromley
Assistant to the President for Science & Technology
The White House Office of Science & Technology Policy
WASHINGTON
D.C.
U.S.A.

Dear Dr. Bromley

It was a great pleasure to meet you at the AAAS conference recently, and I am grateful to you for sparing the time to give us an interview. Part of the interview was included in our programme, "SCIENCE NOW", broadcast last week. I am pleased to enclose a cassette copy for your interest.

Once again, many thanks for your help.

Yours sincerely

A handwritten signature in cursive script, reading 'Julian Brown'.

Julian Brown
Senior Producer
Science Programmes, Radio

ENC.

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9120770

SPEECH: YES NO

FROM: DETRE, Thomas: UNIVERSITY OF PITTSBURGH

DATE OF EVENT: 05/03/91

LOCATION OF EVENT: CONCORDIA CLUB, 4024 O'HARA STREET, PITTSBURGH, PA

TIME OF EVENT: 09:00AM

SUBJECT: INVITATION TO A WORKSHOP ENTITLED "ENVIRONMENTAL
RISKS: A DIALOGUE FOR INDUSTRY, GOVERNMENT AND
ACADEMIA" TO DISCUSS RISK ASSESSMENT METHODOLOGY.

RSVP:

CONTACT PERSON: PEGGY ALLPORT

CONTACT NUMBER: 412/624-3000

INVITATION ACCEPTED?

~~YES~~ NO

COPIES TO: Nancy Maynard
Dr. Phillips
Dr. Wong
Life Sciences

REMARKS: 3/25/91 - Regatta to Peggy Allport!
mn

DATE OF LETTER: 03/12/91

DATE RECEIVED: 03/15/91

FILE: P-INVITATION-DISCUSSION Panel



University of Pittsburgh

HEALTH SCIENCES
Senior Vice President
UNIVERSITY OF PITTSBURGH MEDICAL CENTER
President

March 12, 1991

9120770
RECEIVED

91 MAR 15 P 3:02

OFFICE OF THE
DIRECTOR

The Honorable Allan Bromley
Assistant to the President for Science
and Technology Policy
360 Old Executive Office Building
17th Street & Pennsylvania Avenue, N. W.
Washington, DC 20506

Dear Mr. Bromley:

Environmental risks pose increasingly complex challenges for government, academia, and industry as solutions must be devised that are both efficient and cost effective. Building on its strong expertise in the area of the risk sciences and convinced that high level linkages are imperative if these hazards are to be appropriately managed, the University of Pittsburgh Graduate School of Public Health and the University of Pittsburgh Medical Center are sponsoring a risk science workshop entitled "Environmental Risks: A Dialogue for Industry, Government, and Academia" on Friday, May 3, 1991. I would like to extend a warm, personal invitation to you to attend this workshop, which will be an executive-level, discussion-oriented program with limited attendance (approximately thirty participants) to encourage dialogue among top industry and government officials and academic scientists.

The workshop will begin at 9:00 a.m. and conclude with a wrap-up session at 3:30 p.m., followed by a reception from 5:00 p.m. to 7:00 p.m. The location of the workshop is the Concordia Club, 4024 O'Hara Street, Pittsburgh, PA 15213.

Dr. Frank Young, Deputy Assistant Secretary for Health/Science and Environment, U.S. Public Health Service, Department of Health and Human Services, has been invited to participate and to provide a summary of federal initiatives in the risk sciences. Other invitees include executive representatives from the Department of Defense, the U.S. Environmental Protection Agency, the National Institute for Occupational Safety and Health, the Pennsylvania Department of Environmental Resources, the Center for Hazardous Materials Research, and the largest international industrial corporations headquartered in Pittsburgh. The academic participants will be

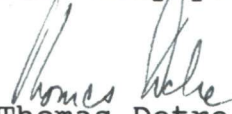
The Honorable Allan Bromley
March 12, 1991
Page 2

drawn primarily from risk science, environmental and occupational health, toxicology, epidemiology, radiation safety, chemistry, and engineering at the University of Pittsburgh. I am enclosing a tentative agenda for the workshop and a statement of objectives and goals. More detailed information will be provided to you shortly.

Ms. Peggy Allport from Dean Donald Mattison's office in the Graduate School of Public Health is coordinating arrangements for the workshop. Her telephone number is 412-624-3000. Her fax number is 412-624-3309. She will be contacting your office in the near future regarding your participation in the workshop.

I look forward to seeing you on May 3, 1991. I believe that the risk science workshop will enable your agency to address more clearly the challenges in risk assessment methodology and risk management.

Sincerely yours,



Thomas Detre, M.D.
Senior Vice President
for Health Sciences
President, University of
Pittsburgh Medical Center

TD/psa
Enclosures

TENTATIVE SCHEDULE
RISK SCIENCE WORKSHOP
Friday, May 3, 1991

9:00 am - 9:15 am	Greeting Dr. Wesley W. Posvar, President (invited) University of Pittsburgh
9:15 am - 9:45 am	Charge To The Workshop "Initiatives at the National Academy of Sciences" Dr. Donald R. Mattison, Dean Graduate School of Public Health University of Pittsburgh
9:45 a.m. - 10:00 a.m.	Break
10:00 a.m. - 12:00 p.m.	Work Group Breakout Risk Assessment Risk Perception Risk Communication Risk Management
12:00 p.m. - 1:30 p.m.	LUNCH Presentation on Environmental Economics or Environmental Ethics
1:30 p.m. - 3:30 p.m.	Work Groups Reconvene Risk Assessment Risk Perception Risk Communication Risk Management
3:30 p.m. - 5:00 p.m.	Wrap-up: Federal Initiatives in the Risk Sciences Dr. Frank Young, Deputy Assistant Secretary for Health/Science and Environment, Public Health Service Working Group Presentations Chaired by: Dr. Thomas Detre Senior Vice President for Health Sciences President, University of Pittsburgh Medical Center Risk Assessment Risk Perception Risk Communication Risk Management
	Summary/Close Dr. Thomas P. Detre Senior Vice President for Health Sciences President, University of Pittsburgh Medical Center
5:00 p.m. - 7:00 p.m.	Reception

RISK SCIENCE WORKSHOP

**Environmental Risks:
A Dialogue for Industry, Government and Academia**

Sponsored by

The University of Pittsburgh
Graduate School of Public Health
and the
University of Pittsburgh Medical Center

May 3, 1991

9:00 a.m. - 5:00 p.m.

Concordia Club
4024 O'Hara Street
Pittsburgh, PA 15213

Introduction: The Evolution of the Risk Sciences

Risk assessment, risk perception, risk communication and risk management have placed an increasing level of complexity on industry and government. Academic programs may be in a position to help both industry and government deal with these new complexities.

Goal:

The goal of the workshop is to create a dialogue among industry, academia and government on all components of the risk sciences.

FOR MORE INFORMATION CONTACT

Ms. Peggy Allport
412-624-3000 (phone)
412-624-3309 (fax)

"CORRESPONDENCE TRACKING"

TYPE: INVITATION-PANEL DOCUMENT NUMBER: 9121899
ORIGINATOR: 02 STATUS C DIRECTORATE STATUS

FROM: SMITHERMAN, Herbert C.: NATIONAL ORGANIZATION FOR THE
PROFESSIONAL ADVANCEMENT OF BLACK CHEMISTS & CHEMICAL
ENGINEERS.
TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 02/05/91

SUBJECT: INVITATION TO PARTICIPATE AS CHAIRPERSON FOR A PANEL
DISCUSSION AT THE ANNUAL MEETING OF NOBCChE.

DIRECTORATE STAFF
ASSIGNED: D. Allan Bromley ASSIGNED:

ACTION STAFF
REQUIRED: ACTION:

SENDER'S DUE DATE: 02/15/91
OSTP DUE DATE: 02/15/91 STAFF DUE DATE
DATE COMPLETED: 03/01/91 DATE COMPLETED/DEPT:

COPIES TO:

WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:
REMARKS:

OSTP RECEIVED: 02/06/91
DEPT RECEIVED:

FILE: P- INVITATION *Panel*

THE WHITE HOUSE

WASHINGTON

March 1, 1991

Dear Dr. Smitherman:

Thank you for your letter of February 5, 1991, inviting me to participate in your annual meeting of the National Organization for the Professional Development of Black Chemists and Chemical Engineers scheduled for April 2 in Washington, D.C. I apologize for the much belated response.

Because we are very concerned about future leaders and increasing the participation of minorities in science and technology, I would very much have liked to contribute to your organization's efforts. However, the dates in question are not good for my schedule. As much as I would like to join you, I must regretfully decline your kind invitation.

Thanking you for thinking of me and may I offer my best wishes for success in the activities of the NOBCCChE.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "D. Allan Bromley", with a stylized flourish at the end.

D. Allan Bromley
Assistant to the President
for
Science and Technology

Dr. Herbert C. Smitherman
The Procter and Gamble Company
Miami Valley Laboratories
P.O. Box 398707
Cincinnati, Ohio 45230

National Organization for the Professional Advancement of Black Chemists and Chemical Engineers

February 5, 1991

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Lawrence Livermore National Lab.
Livermore, CA 94550

Vice-President

Ms. Winifred Burks
Lawrence Livermore National Lab.
Livermore, CA 94550

Secretary

Ms. Anita Osborne-Lee
Martin Marietta Energy Systems, Inc.
Oak Ridge, TN 37831

Treasurer

Ms. Rosanne A. Smith
Martin Marietta Energy Systems Inc.
Oak Ridge, TN 37831

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Houston, TX 77004

West

Dr. Reginald Mitchell
Sandia National Laboratory
Livermore, CA 94550

The Honorable D. Allan Bromley
Assistant to the President for Science and Technology
Old Executive Building
17th and Pennsylvania Avenue
Suite 358
Washington, D.C. 20500

Dear Mr. Bromley:

The purpose of this letter is to invite you to participate as Chairperson for a panel discussion at the annual meeting of the National Organization for the Professional Development of Black Chemists and Chemical Engineers (NOBCCChE). The meeting is being held in Washington, D.C., at the Ramada Renaissance Hotel-Techworld from April 1 through April 5.

The specific panel discussion for which you are invited to chair is scheduled for April 2 beginning at 9:15 a.m. to 12:00 noon. We are expecting to have three CEO's of major corporations to prepare a 30 minute talk on the subject "What Do You See as the Challenges for Organizations in the 90's and the Role that Scientists and Engineers are Expected to Play." Your participation would require you to prepare a 10 minute introduction for this panel. The audience will consist of predominantly black chemists and engineers employed by government, industry and academia. There will also be several high school and college students present.

The panel subject was chosen because a great deal is being written and discussed today about future organization design, innovation, characteristics of future leaders and globalization. These issues are importantly related to the training, development and career options for scientists and engineers in the future.

By way of a brief background, this is the 18th anniversary of the Annual National NOBCCChE meeting. The objective is to provide an environment for black scientists and engineers to meet as a group to discuss and exchange viewpoints in their technical areas of expertise to enhance their growth and development as professionals. More details on our organization and its objectives are discussed in the attached document.

We certainly hope that you are able to participate. Your perspective and insight on this subject would be very impactful for our group. Please advise me as soon as possible, but by February 15, if you will be able to accept our invitation.

Thanks in advance for any consideration given this request.

Herbert C. Smitherman

Herbert C. Smitherman, Ph.D.
Chairperson

CEO Forum Committee

National Organization for
Professional Advancement of
Chemists and Chemical Engineers

Attachment

2/20 added
513/245-2219
5132451045

You may respond by writing or calling me as noted below.

Herbert C. Smitherman, Ph.D.
The Procter & Gamble Company
Miami Valley Laboratories
P.O. Box 398707
Cincinnati, OH 45230
(513) 245-2219
Fax: (513)245-1045

**NATIONAL ORGANIZATION FOR THE PROFESSIONAL ADVANCEMENT
OF BLACK CHEMISTS AND CHEMICAL ENGINEERS**

I. STATEMENT OF GOALS AND OBJECTIVES

The National Organization for the Professional Advancement of Black Chemists and Chemical Engineers was established to develop programs to assist Blacks in realizing their full potential in the fields of chemistry and chemical engineering. It was organized to meet a need that is not being met by existing organizations. Presently, the Organization depends upon the existing talent among Blacks in the fields of chemistry and chemical engineering and to aid in the accomplishment of the program objectives.

II. BACKGROUND

An Ad Hoc Committee for the Professional Advancement of Black Chemists and Chemical Engineers was organized April 25, 1972. The establishment of the committee was assisted financially by "seed" grants for \$850 and \$400 from the HAAS Community Fund administered through Drexel University. The Organization formerly came into existence as a result of the enthusiastic response received for this professional group, to a questionnaire designed to ascertain their interest and participation in the creation of an official organization. The Executive Committee met on September 9, 1972, to set up a structured organization and to prepare proposals for securing funds to finance the planned programs.

In order to achieve the goals of the Organization, programs have been designed, the accomplishment of which are achieved through the efforts of national, regional, and local committees. Typical program activities involve:

A. Establishment of a Computerized Record File

A centralized computer file has been established of Black chemists and chemical engineers who are professionally active in the above fields. These files list pertinent information such as speciality, employment, education, affiliation with federal agencies or private foundations, research activities, etc. This specific information is disseminated to the public. Any information about an individual is released after receiving written approval. This information serves as a major resource for locating talent that can participate in ongoing program activities.

B. Recruitment of Blacks in the Science and Engineering Professions

This Organization actively encourages young Blacks to pursue careers in science and engineering. It accomplishes this end by the production of programs, using the latest audio-visual techniques, to introduce junior and senior high school students to the work of active Black scientists and engineers. The Organization seeks to establish scholarship awards or work-study assistance for outstanding Black high school and college seniors. It serves as a clearinghouse for information about scholarships for students. This information is provided to the computerized roster which, in turn, serves as a local source for such information. Persons listed in the computerized file also encourage their local industries and governments to hire summer students in an active and meaningful scientific role in their organizations.

NOBCCHE
PAGE 2

C. To Promote More Active Participation of Blacks in Scientific Research

The more active participation of Blacks in scientific research is accomplished by providing any assistance necessary, technical or otherwise, in the acquisition of support funds. This includes, technical assistance in proposal writing, information on current trends in funding, and serving as a liaison between the grantor and various granting organizations.

Awards have been established to recognize outstanding achievements by Blacks in teaching and research and are awarded annually at the National Meeting.

D. Establishment of an Information and Consultant Service for the Black Community

The present organization provides technical assistance and advice to national and local organizations on the impact of chemistry and chemical engineering on their lives. Specifically, the Organization lends its expertise to organizations such as the Congressional Black Caucus, the National Urban Coalition, local community groups, etc., so that they will have a firm technical foundation on which to base their decisions concerning science and technology. Examples of this program are the technical evaluation of proposals for differing methods of cleaning the environment, the surfacing of particular community problems such as high local concentrations of pollutants in the inner city, and health-related problems associated with the inner city. This is just a brief list of problems from which local and national organizations seek the technical expertise of the present Organization. Finally, it is expected that the Organization could provide a resource of Black technical expertise for the black communications media such as Ebony, The Black Journal, local talk shows, etc.

E. Increase Participation of Blacks in Advisory Boards

There is an acute lack of Black representation on scientific advisory boards and committees of both private and federal funding agencies. This situation, we feel, places Blacks at a distinct disadvantage in competing for funds or making their points of view known to these bodies. We have provided and will continue to provide all such bodies with competent Black scientists qualified to serve on such boards and committees. We strive to get these persons appointed to policy-making positions and those involving the actual allocation of funds.

F. Establishment of a Newsletter

A newsletter is published quarterly. We believe this is an effective means of sharing information and improving the communication among Black professionals.

NOBCCHE
PAGE 3

III. ANNUAL NATIONAL MEETINGS

We have held 17 national meetings and the 18th is planned for April 2, 1991, in Washington, D.C. Such a meeting provides a rare opportunity to bring together Black chemists and chemical engineers to share perspectives on key issues confronting Black scientists and engineers.

DESCRIPTIONS OF SOME FORUMS AND SYMPOSIA

FORUM I: Organization of Black Scientists

Novel Food Ingredients for the 1990s and Beyond: Regulatory and Safety Considerations

Explosive changes in the food industry have taken place over the past five years. The trend in the industry during this time has been towards foods that look good, taste rich, but are low in salt, calories, and fats. There is no reason to believe that this trend will not continue, well beyond the 1990s, as the American public becomes more concerned about the relationship of food and health. This forum examines the regulatory and safety considerations as more and more of these products move from the research and developmental stages to on-line production.

FORUM II: Chief Executive Officers

What Corporate Chief Executive Officers see for Tomorrow

The Nineties promise to bring significant changes and challenges in the way corporations are organized, the types of talents required, the decision making processes, expansion opportunities in the U.S. and abroad, and a vastly enhanced competitiveness. The Chief Executive Officer (CEO) Forum will consist of 8-5 CEOs of major U.S. corporations which are driven by technological innovation, giving their insight into the challenges posed by the years ahead. The format will be a Panel Discussion with each CEO giving a 30-minute talk on the subject, "What Do You See As the Challenge for Organizations in the 90's and the Role that Scientists and Engineers are Expected to Play." After all of the discussions have been completed, the audience will have an opportunity to direct questions to any of the speakers.

FORUM III: Moving Toward Workforce 2000

Studies of emerging trends in America's work places make clear the need to plan for a changing workforce. Major changes will be required to accommodate both the work and home needs of a workforce projected to grow slowly, become older, more female, more minority, and more disadvantaged. A panel of three experts will address hiring policies, performance feedback, training and re-training for the jobs of the last years of the twentieth century. Part-time work, job-sharing, working at home, child-care, elder-care will be explored as options whose time has come. The Forum is expected to last a maximum of two hours.

FORUM V: National Intellectual Property Law Association

African American Perspective and Inventive Genius

The importance of Black involvement in the U.S. intellectual property is critical to minority economics as the U.S. Patent, Trademark and Copyright systems are keystones supportive of the nation's economy. The seminar will focus attention to the minority community and cover patents and African Americans who exploited benefits derived from these systems.

FORUM VI: Introduction to Science and Math/K thru 6 Students

Three Part Program:

- I. NIH MARC Scientists - Elementary schools to host and introduce a MARC scientist - Dr. Elward Bynum
 - Friendship Educational Center
 - Glen Haven Elementary School
 - Cora B. Kelly Magnet School
- II. Telecommunications and Science Education - Ms. Marlene Turner
 - Challenger Center for Space Education
 - Young Astronaut Council
 - National Geographic Society Kids Network
 - NASA Educational Division
- III. Science Demonstration Projects - Mr. Harold Goodridge
 - The Learning Tree
 - Flowers of Africa
 - Shiloh Baptist Church
 - Peace Baptist Church
 - Amidon Elementary School
 - Richardson Elementary School

SYMPOSIUM III: Joint Educational Facilities - S.M.A.R.T. Affiliate-Expert Systems for Teens

Junior and senior high school students have developed an Artificial Intelligence (AI) model of a Black Teenager written in PDC Prolog. The model contains a collection of the thoughts, perceptions, and ideas of the original eight teenagers that relate to those issues that get the most publicity in today's society. They are as follows: drug and alcohol abuse; sex and pregnancy; their perception of themselves and the opposite sex; education, both traditional and non-tradition; strengths and weaknesses of the Black family; and teen suicide. If a question, pertaining to one of the issues is asked of the system, it will answer as if one of the original teens were answering a peer as opposed to an adult. The model has been demonstrated in New Orleans, Washington, D.C., Los Angeles, Atlanta, and Birmingham. The format of the presentation consists of 5-10 minute presentations by students and instructors on various topics in artificial intelligence model of a Black Teenager and other artificial intelligence programs.

**THE PROCTER & GAMBLE COMPANY**

MIAMI VALLEY LABORATORIES

P. O. BOX 398707, CINCINNATI, OHIO 45239-8707

TRANSMITTAL SHEET**FAX NUMBER:** (513) 245-1045**DATE:** 2/6/91**PLEASE DELIVER THE FOLLOWING PAGE(S) TO:****Name:** THE HONORABLE D. ALLAN BROMLEY**Address:**

ASSISTANT TO THE PRESIDENT FOR SCIENCE AND TECHNOLOGY

OLD EXECUTIVE BUILDING

17TH AND PENNSYLVANIA AVENUE

SUITE 358

WASHINGTON, D.C. 20500

FAX #: (202) 395-3261

Your Name:

MR. HERBERT C. SMITHERMAN

Address:

THE PROCTER & GAMBLE COMPANY

Phone Number:

(513) 245-2219

Number of Pages including this page 7**IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL BACK AS SOON AS POSSIBLE.**

"CORRESPONDENCE TRACKING"

TYPE: ACTION

DOCUMENT NUMBER: 9120656

FROM: BRANSCOMB, Lewis: HARVARD UNIVERSITY

TO: DR. BROMLEY

DATE OF
CORRESPONDENCE: 03/01/91

SUBJECT: REQUEST FOR DR. BROMLEY'S FLIGHT INFORMATION AND
REQUESTS TO SCHEDULE ADDITIONAL ACTIVITIES PRECEDING
THE FORUM.

ASSIGNED TO: D. Allan Bromley

ACTION REQUIRED: AS NECESSARY

SENDER'S DUE DATE:

OSTP DUE DATE: 03/08/91

DATE COMPLETED: -----

COPIES TO: Marian Nida

WHITE HOUSE TRACKING #:

CONTACT PERSON: GRACEANN TODARO

REMARKS:

DATE RECEIVED: 03/07/91

FILE: p- INVITATION FOLLOW-UP

Panel

Close out
3/13
DAB completed
his trip

9120652

HARVARD UNIVERSITY
CENTER FOR SCIENCE AND INTERNATIONAL AFFAIRS

Professor Lewis M. Branscomb
Director, Science Technology and Public Policy Program
Albert Pratt Public Service Professor
(617) 495-1853

91 MAR 7 AIO: 08

John F. Kennedy School of Government
79 J.F.K. Street
Cambridge, Massachusetts 02138
Fax: (617) 495-5776

OFFICE OF THE
DIRECTOR

March 1, 1991

The Honorable D. Allan Bromley
Assistant to the President for Science and Technology
The White House
Washington, D.C. 20506

Dear Allan,

I am delighted that you are planning to be with us on March 13 for an 8:00 pm Forum event. We hope that you can also accept an invitation to dinner preceding the Forum. This dinner would give you the chance to meet a group of about fifty leaders of the Cambridge science, engineering, industrial and public policy communities who share a keen interest in the health of the nation's science and technology and its productive use on behalf of the economy.

If it is possible for you to come earlier than dinner (4:00 pm would be ideal), my colleagues and I would be very pleased to give you a private briefing on some work we have done that you may find of value -- especially our three-year project, now in book manuscript, which examines the relationships between government-driven (primarily defense) innovation and commercial innovation. From this project on dual use technology and from our views of the changing circumstances to which U.S. policy needs to respond, we have tried to lay the groundwork for technology policy options for the future. It is this work that causes us to favor some of the ideas in the administration policy of which you were the architect.

I understand that the title of your talk will be "*U.S. Technology Policy: Can it Help Make American Companies Competitive?*" I hope very much that the Forum discussion will be able to explore some of the directions for the future that Americans need to be thinking about -- both with respect to how government and private interests share stewardship for U.S. technical capabilities and to how the scientific community can contribute more effectively to the public good. Participating in the Forum as respondents will be Ashton Carter, Director of the Center for Science and International Affairs; Robert Kuttner, Syndicated Columnist and Economics Correspondent for the *New Republic*; and Linda Wilson, President of Radcliffe College (tentative). I will moderate.

If you could have your assistant contact Graceann Todaro at 617/495-3745 with your flight information, I will be happy to pick you up at Logan Airport. Dinner will begin with a cocktail reception at 6:00 in the Stratton Room at the Charles Hotel, which is situated next door to the Kennedy School. We have also made arrangements for your overnight accommodations at the Charles Hotel.

We appreciate the opportunity to hear your views and we all look forward to having you among us.

Sincerely,

Lewis M. Branscomb
Lewis Branscomb

cc: Heather Campion

enc.

Carnegie Commission on Science, Technology, and Government
SYMPOSIUM AT THE 1991 AAAS ANNUAL MEETING IN WASHINGTON, DC.

**"Technology Policy and the U.S. Economy:
The Case for a Diffusion-Oriented Strategy"**

Lewis M. Branscomb, Director
Science, Technology and Public Policy Program
Center for Science and International Affairs
J.F. Kennedy School of Government, Harvard University

Feb. 16, 1991

Summary

As the U.S. experiences rapid change in its international political and economic circumstances, public debate about science and technology (S&T) as agents of change and as means for coping with it intensifies. Scholars who compare national policies for science and technology have observed that U.S. policy since World War II has been driven by federal investments in the creation of sophisticated technologies to serve as drivers of national capability, while many other countries have given higher priority to enhancing the ability of individuals and firms to acquire and absorb technologies in pursuit of economic objectives. As world economies have become more intertwined, especially through the growth of multinational firms with subsidiaries in many nations, governments have also faced difficult choices, both as to the strategy they should pursue domestically and how that domestic strategy relates to the world economy. This paper explores one line of choice for the U.S. — a more capability-enhancing or "diffusion" strategy — and notes that it may also be more appropriate than strategies aimed at bolstering the technology of strategic industries in the presence of rapid growth of direct foreign investment in the U.S.

* * * *

Those who study public policy for science and technology look for evidence that the paradigms on which policy rests are changing. The most obvious evidence is the change in language used to carry the debate. In the 1960's and 1970's the focus was on fostering **innovation**¹, especially in small and start-up firms. The seminal document was

¹ Innovation comprises the steps required to create a new product or service and bring it to market. The customary view of innovation includes only the first two steps of Henry Ergas' four stage model of innovation: generation and application. See Henry Ergas, "Global Technology and National Politics," unpublished paper for the Council on Foreign Relations, 26 June 1989.

a report issued in January, 1967, by the Commerce Technology Advisory Board (CTAB) entitled Technological Innovation: Its Environment and Management, prepared under the chairmanship of Robert Charpie of Cabot Corporation and known as the "Charpie Report." The focus on innovation culminated in the 1979 message from President Carter² to the Congress transmitting recommendations prepared by an interagency team led by Jordan Baruch, Assistant Secretary of Commerce. Both of these reports, and much that occurred between them, emphasized the need to ease antitrust and regulatory constraints and provide technical information services designed to remove barriers impeding private sector innovation.

In the 1980's the focus shifted to **competitiveness**³ – a much broader notion than innovation, for it is concerned with fruitful outcomes from innovations that are evident in macro-economic and trade statistics. Americans began to appreciate that the sources of Japanese and German competitive advantage came from their attention to process technology, manufacturing quality and rapid, evolutionary response to market signals, all enhanced by a high level of capital investment and a national focus on export performance. Nevertheless, the political response was largely confined to activities in R&D: increased emphasis on the funding of "dual use" technologies by defense agencies, especially the Defense Advanced Projects Agency (DARPA), together with legislation to promote technology transfer from government laboratories to private firms.

Thus debates over the scientific and technological components of innovation and competitiveness policy have been largely restricted to discussion of research and development (R&D) and the federal role in R&D investments. Since the passage of the Omnibus Trade Act of 1988⁴, however, the debate has begun to shift from discussions of federal R&D to federal support for commercial **technologies**⁵. That Act renamed the

² Public Papers of the Presidents of the United States: Jimmy Carter 1979, Book II June 23 to Dec. 31, 1979, Washington DC: U.S. Government Printing Office, 1980 pp 2068-2074. See also Bruce L. R. Smith, American Science Policy Since World War II, Washington DC: Brookings Institution, 1990, p. 94 and references cited there.

³ A competitive firm or industry is one whose products exhibits favorable price, function and quality, permitting a stable or growing share of market. When applied to a national economy, a further constraint must be added to the definition: achieved with stable real wages of the firm's workers.

⁴ Bruce L.R. Smith, loc. cit. p. 140.

⁵ Technologies include not only technical knowledge but all of the facilities and other capabilities necessary to the creation of the artifacts and applications for which technologies are created.

National Bureau of Standards the National Institute for Standards and Technology, creates a Technology Administration in the Department of Commerce, and establishes (with minimal funding) a program of investment in "precompetitive, generic technology" (called the Advanced Technology Program, or APT.)

In 1989, Senator Bingamon and the Senate Armed Services Committee also began asking the Departments of Defense and Commerce, and more recently the Office of Science and Technology Policy (OSTP) to provide the Congress with identification of critical technologies deserving of federal investment, "R&D" has begun to be replaced by "technology" as the subject of discourse. This is a significant change, for technologies include much more than R&D. Thus the discussion of federal support for technologies of commercial value now incorporates the "downstream" elements of technical activity, including production and application experience.

The funding of technology to enhance the base capabilities of commercial industry, even if restricted to "precompetitive, generic technology," represents a significant extension of U.S. technology policy. Until very recently any federal investment other than basic research or technology required in the execution of federal agency missions was likely to be suspect and tainted with "industrial policy." Today there are proposals to create a civilian version of DARPA in the Commerce Department⁶ called the Advanced Civilian Technology Agency or ACTA, (sometimes called CARPA) and, alternatively, a proposal to broaden the dual-use technology mission of DARPA by making in a National Advanced Project Agency ("NARPA") operated by Defense but authorized to manage funds invested by the civil agencies as well.

Even as Washington struggles for political comfort with these proposals for federal investment in the commercial technology base, a case can be made that a technology policy to address U.S. competitiveness problems must go beyond "science and technology push" strategies. It is my view that not only is this case valid, but I believe there is evidence that a shift from "mission-driven" to "diffusion-driven" policy is already underway, notwithstanding the "beltway cynics," who seldom acknowledge a policy shift until it appears as a big lump in the federal budget.

Since World War II, U.S. (and French and British) science and technology policy have been described by Henry Ergas as described as mission-oriented.⁷ The federal

⁶ Legislation to this effect was proposed by Senator Glenn of Ohio in S.1978, the "Trade and Technology Promotion Act," but it was Senator Hollings' more conservative proposal that was incorporated in the Omnibus Trade Act of 1989.

⁷ Henry Ergas, "Does Technology Policy Matter?", in Bruce Guile and Harvey Brooks, loc. cit.

government has provided both high levels of basic scientific research and ambitious national engineering projects intended to create radical technological innovations. This strategy has served U.S. needs for super-power prestige and helped give rise to new industries, both here and abroad.

For the first thirty years of the post-war period, U.S. firms exploited the new technologies successfully and without serious competitive challenge. Since the mid-'70's, however, it has become increasingly clear that the diffusion-oriented strategies of nations such as Germany, Sweden and Switzerland were bringing the benefits of the new technology more broadly to their manufacturing firms. Japan, Korea and Taiwan, in Ergas' view, followed producer-oriented strategies combining elements of high-tech emphasis with rapid diffusions of the benefits. They were even more successful at closing the economic gap with the U.S.

Policies to bolster competitiveness in high tech industry may cover a vast array of government policies and practices. They are designed to foster technological development and commercialization in forms perceived to reflect national interests. Well accepted as elements of national policy in most OECD governments, technology policies to enhance economic performance are now under debate in the U.S. as well, reflecting recognition that the U.S. has some serious competitive disadvantages, especially in manufacturing.⁸ This debate is unfortunately too often shallow, ideological and inconclusive.

One of the unresolved issues is how to define the U.S. national interest with respect to corporate entities operating in the U.S. but with substantial involvement overseas. This involvement might entail foreign ownership, the sourcing of imported products or components, or a variety of economic and technological relationships with other foreign-located enterprises. Even if it were possible to device policies toward such firms that rest on unambiguous economic definition of U.S. interests, the political problems will continue to impede consensus on national policy for dealing with what Bob Reich has so aptly called the "Who's Us?" problem.⁹

It is my contention that this ambiguity about the relationship between the national interest as defined politically and the reality of a global economy causes the most difficulty when the government tries to intervene directly into the competitive standing of selected U.S. industries. However, these problems are minimized if the U.S. pursues a technology policy which is, in fact, the optimum one from the perspective of the well

⁸ Michael L. Dertouzos, Richard K. Lester, and Robert M. Solow, Made in America, Cambridge MA: MIT Press, 1989.

⁹ Robert Reich, "Who's Us?", Harvard Business Review, Jan.-Feb., 1990, p. 306-7.

being of people living in this country. I will return to this point below.

Technology policies are traditionally considered the domain of domestic policy. Implementation of technology policy has, however, become deeply intertwined with foreign relations and trade policy.¹⁰ This circumstance makes defining the national interest both complex and difficult. But science and technology also reflect both local and global characteristics. Even if it were politically possible to identify firms unambiguously as serving either domestic or foreign economic interests, it would not be possible to distinguish domestic from foreign science or to avoid dependency on foreign sources of technology.

There are two classes of justifications for federal expenditures on technology, one political, the other economic. The political justification is the need to pursue technologies for carrying out federal operational responsibilities – most importantly the defense of the nation. Thirty years ago commercial industry was a much more modest contributor to R&D investment than it is today.

In 1960 U.S. defense R&D constituted one third of all the R&D, public and private, spent by OECD nations. A cornerstone of U.S. technology policy was the assumption that "spinoff" from this vast investment, plus that of the AEC and NASA, which were created as technology-specialized "dual use" agencies, would provide sufficient stimulation to commercial industry to keep it ahead of foreign competitors. Spinoff was treated as though it were automatic and free; it was assumed to diffuse to users through paths to which government paid little attention. This strategy is no longer viable under current economic conditions, given the inefficiency of U.S. technology diffusion, and the rapid rates of commercialization many foreign firms now demonstrate.¹¹

The conventional economic justification for federally funded research investments is the presence of large externalities for the economy. There is wide acceptance of this justification for treating basic scientific research as a public good. Within the linear innovation model paradigm¹²), and in the absence of fast-moving competitors, the focus

¹⁰ Sylvia Ostrey, Governments & Corporations in a Shrinking World, New York: Council on Foreign Relations Press, 1990.

¹¹ John Alic, Lewis Branscomb, Harvey Brooks, Ashton Carter and Jerry Epstein, Beyond Spinoff: Relating Military and Commercial Technologies in a Changing World, in preparation for publication in 1991.

¹² The mechanism through which grand engineering projects stimulate industrial technology is generally assumed to be the transfer, or "spinoff," of advanced concepts which find application in commercial industry. This mechanism, like the eventual appearance of commercial products from federally funded basic research, is sequential in time, hence "linear" rather

on science policy as an economic strategy was not unrealistic in the post-war years until about 1970. During that period the federal government -- primarily the department of defense -- totally dominated national investments in technology, justified by the pursuit of specific federal missions.

Without departing from policies compatible with sound economics, the "diffusion-oriented" policies of Germany, Sweden and Switzerland are designed to accelerate commercialization of innovative ideas, to increase the productivity and lower the cost of industrial production, and to increase the capacity of all firms, large and small, to use technology to enhance their competitiveness. Such a diffusion-oriented¹³ policy for the U.S. might include the following eight elements:

- * Emphasis on human resource development (especially reform of K-14 schooling) to enhance the absorptive capacity of the U.S. economy for useful technology. Particularly important are the school to work transition and the retraining of employed adults.
- * Emphasis on the purposeful diffusion of useful knowledge and practice throughout the U.S. economy, including the knowledge infrastructure to facilitate that diffusion (one example of which is the National Research and Education Network - a high speed digital computer network interconnecting research and educational establishments of all kinds.)
- * Emphasis on creation of "public good" ("generic" or "infrastructural") technologies -- a particularly appropriate role for the Department of Commerce's National Institute for Standards and Technology (NIST) -- and having as its primary value the increase of R&D and engineering productivity.
- * Emphasis on second tier and middle to small firms (especially those defining their business in technological terms) as beneficiaries of both federal and state technology policy;
- * Emphasis on federal cooperation with the 50 state governments as institutional sponsors of industrial extension and other services aimed at economic development.

than recursive (which better describes incremental innovation in commercial firms).

¹³ While "diffusion" is the word policy scholars use to characterize policies of this kind, the reader may find "capability-enhancing" more descriptive. Diffusion strategies are not designed to force the sharing of technological advantage. They are not so much distributive in their objectives; rather the emphasis is on enhanced power to absorb and employ technologies productively. The net effect of a capability-enhancing policy is diffuse economic benefits.

* Continued emphasis on sourcing basic science research primarily from universities (to gain the benefits of more rapid diffusion of the knowledge throughout the economy than is likely from national laboratories.)

* Greater emphasis on effective utilization of existing knowledge and the acquisition of public knowledge from increasingly sophisticated foreign firms and institutions, suggesting more aggressive plans for international cooperation as well as competition in technology.

* Federal encouragement of forward-looking consensus standards, particularly for information management and interchange, as means for accelerating the diffusion of both products and services that increase productivity (such as the CALS project in the defense department).

With all phases of engineering - design, development and production - dependent on a knowledge infrastructure of increasing scientific sophistication, the research agenda to support industrial competitiveness departs significantly from the agenda of basic science. One identifies a broad range of industrially applicable technical knowledge that shares with basic science the quality of high externalities and low appropriability. This body of technology is today being called "generic" technology by many - a term officially introduced in President Carter's recommendations to the Congress on policies to enhance U.S. industrial innovation in 1979.¹⁴ In the Dual Use Technology project we¹⁵ refer to it as "infrastructural" technology.

Examples of infrastructural technology are tools for automated design, materials characterization and synthesis, non-destructive test methods, and software engineering tools -- in short the kind of useful knowledge traditionally produced at NIST (formerly NBS) in the Department of Commerce.

U.S. technology policy should also take much more seriously the importance of accelerated diffusion to industry of the best industrial practice, embodied in information, tools and technology. The cornerstone of this policy should be human resource investments in a technically literate work force, an engineering education system

¹⁴ Public Papers of the Presidents of the United States: Jimmy Carter 1979, Book II June 23 to Dec. 31, 1979, Washington DC: U.S. Government Printing Office, 1980 pp 2068-2074. These initiatives were developed under the Domestic Council by an interagency team headed by Jordan Baruch, Assistant Secretary of Commerce for Science and Technology.

¹⁵ John Alic, Lewis Branscomb, Harvey Brooks, Ashton Carter and Jerry Epstein, loc. cit.

consistent with modern industrial needs, and strong incentives for upgrading skills of industrial workers. Here the Germans, Swedes and Japanese have much to teach us. Substantial emphasis needs also to be given to national infrastructure for communications and information services, and to the evaluation and adaptation for use of the output from federal research investments. Finally, the Commerce Department is beginning to explore the delivery, in cooperation with the states, of industrial extension services, aimed at selection and adoption of productive technology.

Once policy shifts to a more diffusion based strategy, it also loses the narrow focus on technology generated in and by the U.S. government that has characterized the mainstream of U.S. government S&T policy since World War II. A good diffusion strategy gives as much emphasis to importing knowledge and adapting it for use as it does to accessing U.S. generated knowledge. Funding for information collection and evaluation from abroad, and acquisition through joint projects with the Japanese and the European community become important parts of the strategy.

* * *

How likely is it that such a policy shift will occur? I believe it has already begun. On Sept 26, 1990, the President's Assistant for Science and Technology, Allan Bromley, sent to the Congress a U.S. Technology Policy¹⁶, identified as a statement of the Administration's technology policy.

Taken at face value, Bromley's document is important and, depending on interpretation, ground breaking in several respects:

1) For the first time the Administration justifies in a formal policy document direct investments in technology of commercial interest not justified as mission-related or dual-use. "Industry-led ventures to support research on pre-competitive generic technologies" are the focus of the Commerce-NIST Advanced Technology Program, whose budget, while small, is tripled from last year. This is a major step for an administration that reassigned the director of DARPA in a dispute over politically "safer" dual-use technology investments only 10 months ago.

2) The policy commits the administration to investments in an "efficient technological infrastructure, especially in the transfer of information," which includes a major effort to

¹⁶ This document was made available by the Office of Science and Technology on request, but was not initially publicly announced. Despite the low profile with which it was launched, federal agencies and others who favor a "diffusion oriented" policy will reference it to justify activities in support of the commercial technology base. Through this process it will become hardened as policy.

upgrade Internet to a National Research and Education Network. Last minute tactical maneuvering in Congress, not the White House, killed the bill to authorize NREN last year. It is much more likely to pass in the FY 1992 budget, since the Administration requested \$ 92 millions to fund it.

3) The policy strongly emphasizes technology diffusion in its goals, a major departure from the conventional "trickle down" from federal missions approach the U.S. has followed since World War II. Going well beyond the conventional lip service to "technology transfer" this policy takes an integrated view of education and worker retraining, technology utilization, infrastructure, research cooperation and federal cooperation with state initiatives.

4) It emphasizes technology transfer and research cooperation, particularly among small and mid-sized companies, building on state and regional technology initiatives.

The Administration's eight priority needs for the U.S. are all diffusion oriented or concern the economic environment in which it occurs; none of them concern the generation of more mission-driven technology. The document is far short of providing details on how all these objectives should be carried out, how the agencies will acquire the competence to management them, and how funds are to be allocated. But Allan Bromley's OSTP has been able to clear through a traditionally skeptical White House a policy that gives the Congress and the Nation much of what it needs to make progress.

Except in its reference to international cooperation in science and technology, this document does not address directly the difficult problem of eligibility by commercial firms for participation in federal programs aimed at promoting innovation and productivity growth in commercial industry. This is, however, a much reduced problem for a policy that emphasizes strengthening U.S. infrastructure for knowledge diffusion. In addition, the increased role of state governments in these activities decentralizes the decisions and emphasizes the smaller to mid-sized firms that have most or all of their technical capabilities within the U.S.

U.S. multinationals, whose success is of primary concern to the U.S., will not be disbenefited by this policy direction. They connect to the U.S. infrastructure in many places. But they will also not be unduly constrained by it. The biggest controversies over the "Who is Us?" issue arise when the federal government contemplates a strategic technology investment to assist an important but beleaguered industry, such as the SEMATECH project or the proposed investments in the revival of an indigenous consumer electronics industry built around HDTV. In my view these projects are of at least questionable value, primarily because the government is not yet willing to address all the issues required to assure success for the industry. Thus they represent a half-way house to industrial policy, raising many of the controversial political problems (including foreign-owned firm eligibility) without assured delivery of the intended benefits.

Of course, it is appropriate for the U.S. to insist on reciprocal treatment of its industrial entities in other countries, especially if the U.S. adopts the more flexible stance I advocate. It is not yet clear just how much divergence in the innovation policies of nations or groups of nations an integrated world economy can tolerate without excessive political friction. In the end each nation must find its own path toward balancing the domestic and international dimensions of its self interest. The European Community and the Free Trade Association, comprising 18 OECD nations, are attempting to re-optimizing their view of self-interest on a regional scale in Europe. At the same time they are investing quite broadly in their national infrastructures for generating and applying technology. If that kind of re-optimization can occur on a more nearly global scale the zero-sum conflicts over competitiveness may yet give way to a more integrated world economy in which each nation welcomes technology, capital and management skills from others while focusing national efforts on improving the capacity of their nationals to acquire and use technology productively.

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9120279

SPEECH: YES NO

FROM: MCCLINTIC, HOWARD G.

DATE OF EVENT: 04/10/91

LOCATION OF EVENT: UNIVERSITY OF ILLINOIS

TIME OF EVENT:

SUBJECT: REQUEST TO BE A PANELIST AT THE ENERGY RESEARCH AND
DEVELOPMENT TELECONFERENCE

RSVP: 02/24/91

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED?

~~YES~~

NO

COPIES TO: Dr. Wong
Michelle Van Clea

REMARKS:

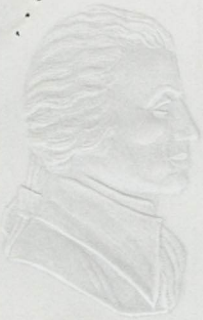
*2/20/91 Regretted to Howard Mc Clintic
mz*

DATE OF LETTER: 01/30/91

DATE RECEIVED: 02/04/91

FILE: *P*-INVITATION/PANELIST-~~ENERGY~~

9120277



The Jefferson Energy Foundation

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January 30, 1991

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Dr. Allan Bromley
Science Advisor to the President
Office of Science and Technology Policy
Executive Office of the President
Washington, D.C. 20500

Dear Dr. Bromley:

I am writing to invite you to consider being a panelist at our Energy Research and Development teleconference to be held at the University of Illinois on April 10, 1991. This program is being co-hosted by the Midwest University Energy Consortium, Argonne National Laboratory, and The Jefferson Energy Foundation. As the enclosed materials indicate, the host and moderator of the Man, Energy & The Environment series has been and will be Mr. Hodding Carter, who will be on-hand for this program.

The Jefferson Energy Foundation is a broad-based 501(c)(3) organization, established four years ago to inform the American people about this Nation's energy choices and risks. Prior to and since its inception, America's energy condition has continued to deteriorate. Crude oil and refined product imports from overseas suppliers, many of which are politically unstable, have increased, such that they meet over fifty percent of our oil supplies. The export market for U.S. coal, which has consistently counterbalanced our international oil trade bill, is less healthy and robust. Public concerns about environmental protection have been awakened and heightened, with relatively less attention paid to equally valid concerns about economic growth and expansion throughout this decade or well into the next century. Our economic future is inextricably tied to our ability to fuel it with reliable supplies of energy. All of The Foundation's public education activities focus on developing a workable national energy-environment policy that balances these important national priorities.

Well over 400 sites are known to have "downlinked" and participated in New Power for a New Century: the Potential of Alternative Sources of Energy. The audience included students at the participating universities (MIT, Penn State, U.C. Berkeley, etc.), as well as many educational and cable television systems' audiences, specific corporate locations (Mobil Coal in Denver, ARCO offices equipped with

Dr. Allan Bromley
January 30, 1991
Page two

ARCOVision), the Auditorium of DOE's headquarters in Washington, D.C. and other subscribers of various teleconference-providing services, like the National University Teleconference Network (NUTN). As you may know, the breadth of our reach was extended in the Fall when the Adult Learning Satellite Service (ALSS) of PBS began promoting and marketing the balance of the Man, Energy & The Environment Series.

All of the members of our National Steering Committee, Board of Advisors, and Board of Directors are of the view that unless energy security is given the same priority on the political agenda as environmental protection, the United States will remain, needlessly, without the uninterruptible supplies of energy required to sustain our national defense and economic security. Only by choosing to produce and conserve more domestic energy in an environmentally responsible manner and rely less on imports, can the nation have control over decisions and events that affect its well-being. A prerequisite for accomplishing these twin goals is public awareness of the true nature of the issues and risks before us.

Over the course of the Man, Energy & The Environment series, 100 or more energy-specific (oil, coal, nuclear, natural gas, renewables) experts, drawn from the academic, political and corporate communities, as well as environmentalists, will debate and discuss their respective views about the shape and direction that America's emerging energy-environment policies should take. The deliberations of these experts will be guided by Mr. Hodding Carter, a most able and fair moderator and program host. Each of the energy-related programs will be hosted by a specific academic institution and be witnessed, thanks to linkage by satellite, by the other participating universities as well as other "downlink" sites around the nation on the actual day of each teleconference.

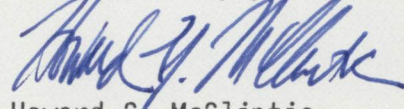
Only by informing the American people about the complex issues and choices that they and their elected leaders must confront about energy development and environmental protection can more viable and successful national policies be formulated. The Foundation will make a consistent and considerable effort throughout each program and the entire series to dispel the diverting idea that energy development and environmental protection are mutually exclusive objectives; rather, they are imperative national priorities, worthy of broad support.

We are attempting to bring this point home to those college students, who participate in each and every teleconference, and the American people who may wish to watch the edited version on PBS as well as cable and commercial television systems. I hope that you agree that this is unique and timely television programming, made available by a broad-based energy education organization (The Jefferson Energy Foundation), not allied with any particular energy industry group. Our funding has largely come from private individuals and foundations, which honor our neutrality and objectivity. In short and in sum, no other organization could undertake a project of similar scope and purpose.

Dr. Allan Bromley
January 30, 1991
Page three

We would very much welcome your involvement on the Research and Development Panel. A preliminary roster of panelists is attached and the programs for the Nuclear Power, Coal, and The Politics of Energy teleconferences are enclosed. Please let me know if you would be willing to be a panelist on April 10th.

Most sincerely yours,



Howard G. McClintic
Executive Director

Attachments & Enclosures



Man, Energy & The Environment

PRELIMINARY AND PROPOSED LIST OF POSSIBLE PANELISTS
ENERGY RESEARCH AND DEVELOPMENT TELECONFERENCE
MIDWEST UNIVERSITY ENERGY CONSORTIUM
AND ARGONNE NATIONAL LABORATORY
APRIL 10, 1991

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The Honorable Gaylord Nelson**
Wilderness Society

* Dr. Alan Schriesheim
Argonne National Laboratory

Host & Moderator: Hodding Carter, III

As of: January 30, 1991

* Accepted
** Invited

A Multi-Media Energy Education Project

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United States Senate

WASHINGTON, DC 20510

December 7, 1990

Howard G. McClintic
The Jefferson Energy Foundation
1111 Sixteenth Street, N.W.
Suite 202
Washington, D.C. 20036

Dear Howard:

I want to let you know how sincerely pleased I was to receive the pewter Jefferson cup. It is a beautiful reminder of my experience with The Politics of Energy program.

It is certainly gratifying to know that there are organizations such as yours acting on their commitment to educate our society on energy related issues. I wish you much success in your endeavors, and I thank you for providing me with an opportunity to be part of that committed effort.

Sincerely,



James A. McClure
United States Senator

McC:rh



November 15, 1990

Mr. Howard McClintic
Executive Director
The Jefferson Energy Foundation
1111 Sixteenth Street, N.W.
Suite 202
Washington, DC 20036

Dear Howard:

Congratulations on your Man, Energy & the Environment project! Each debate is well-balanced and meaningful. And Hodding Carter masterfully hosts the top leaders in the energy field making sure they address the hard issues of the day.

The series has generated a great deal of interest here at the PBS Adult Learning Satellite Service, currently over 200 organizations (including PBS stations, colleges, universities, businesses and state energy agencies) have registered to receive the series. This makes Man, Energy & the Environment one of the most successful videoconference series in the history of ALSS.

Every week more licenses come in from new organizations wishing to sign up. We look forward to the 1991 installments of the series. I think the January show on oil will be a very popular one.

ALSS is especially happy to include Man, Energy and the Environment in its 1990-91 schedule since PBS has designated 1990 as the year of the environment.

Keep up the good work.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Joan Gudgel Oberlin', is written over the typed name.

Joan Gudgel Oberlin
Associate Director, Programming